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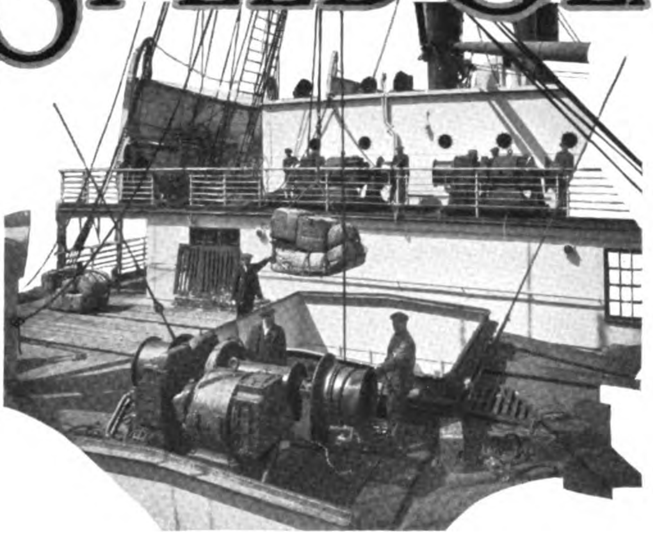

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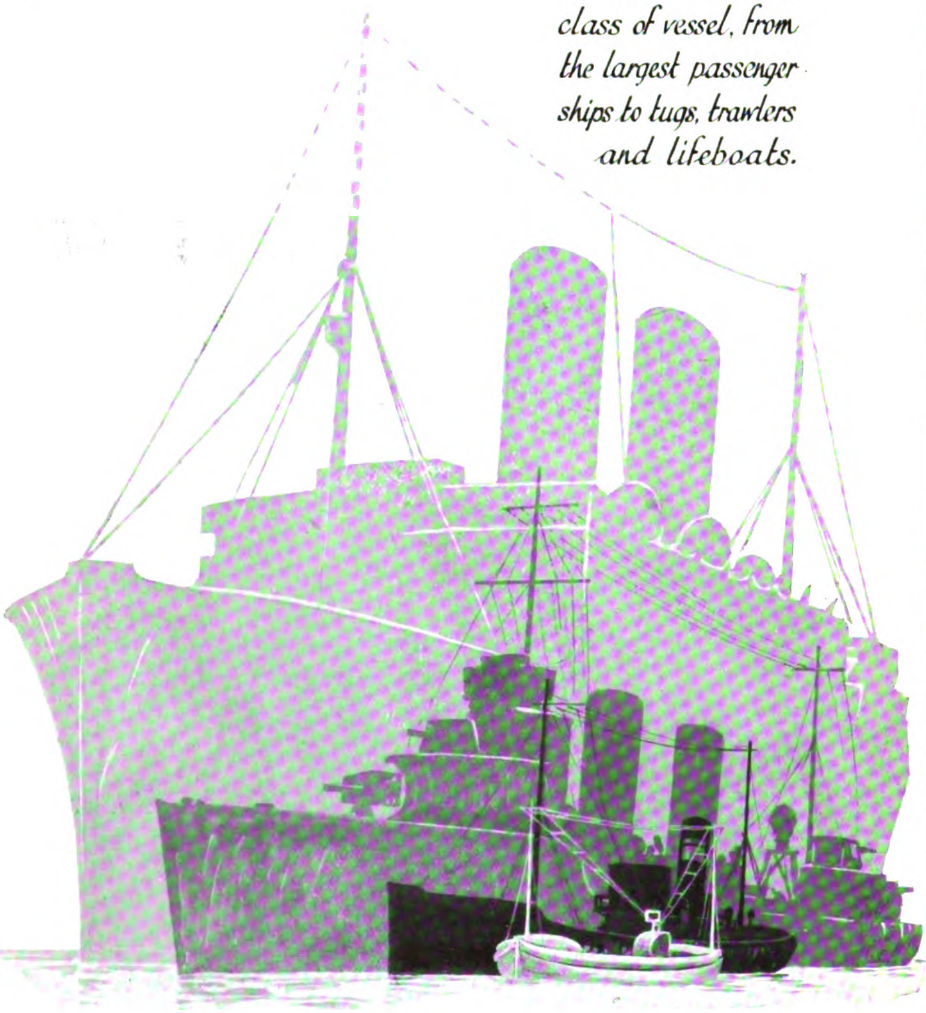

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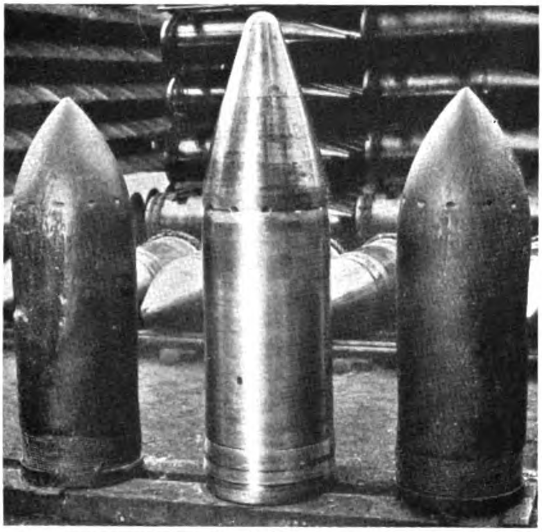

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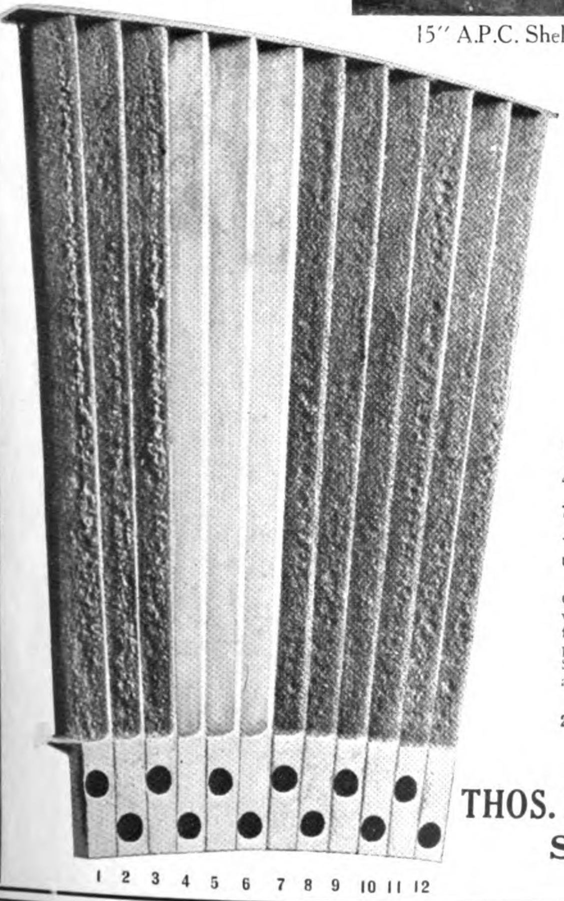

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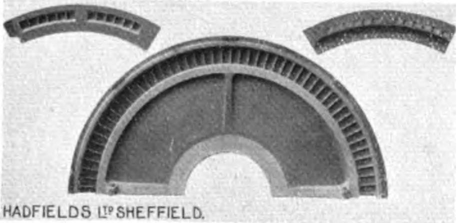

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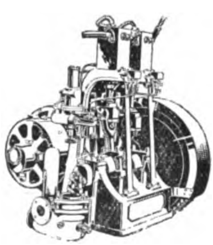

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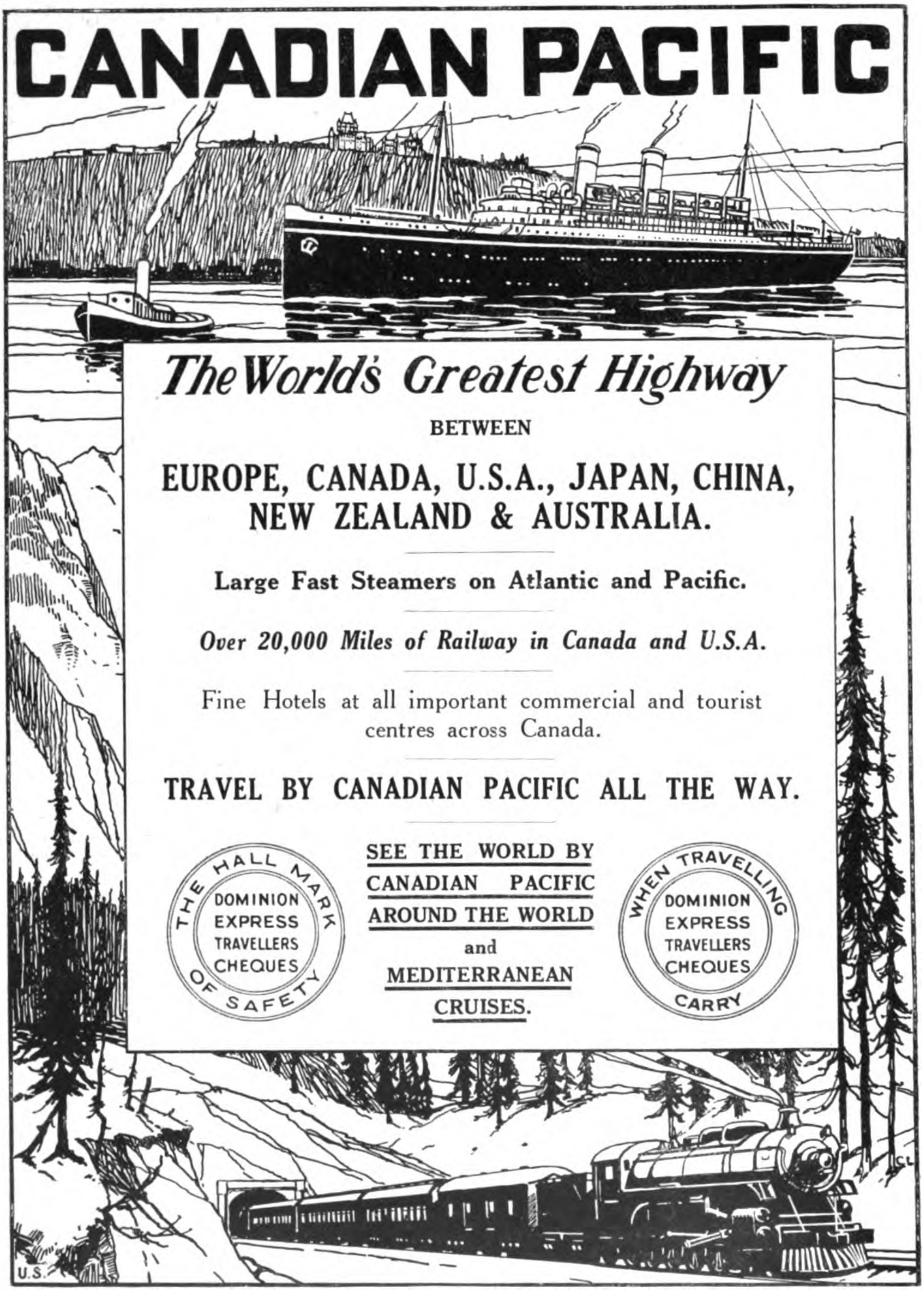

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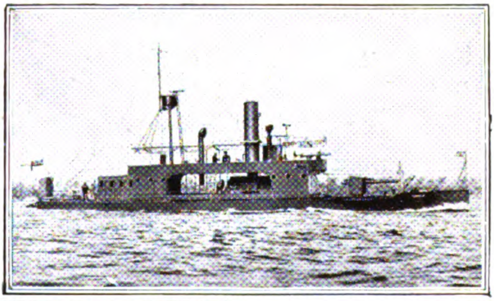

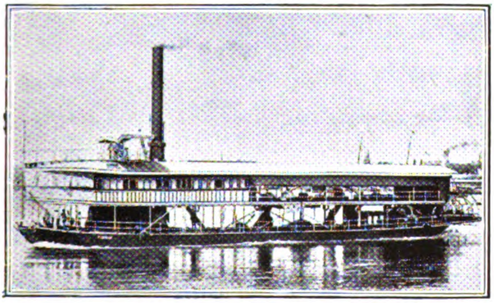

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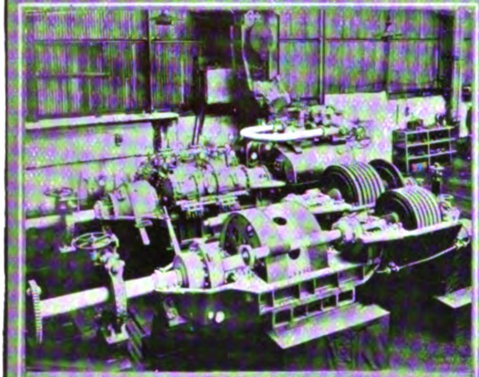

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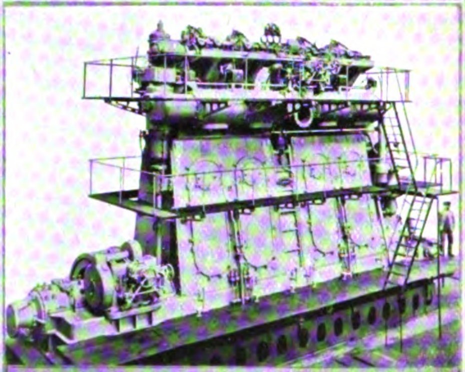

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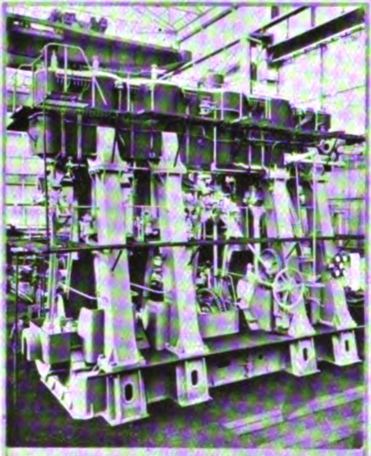

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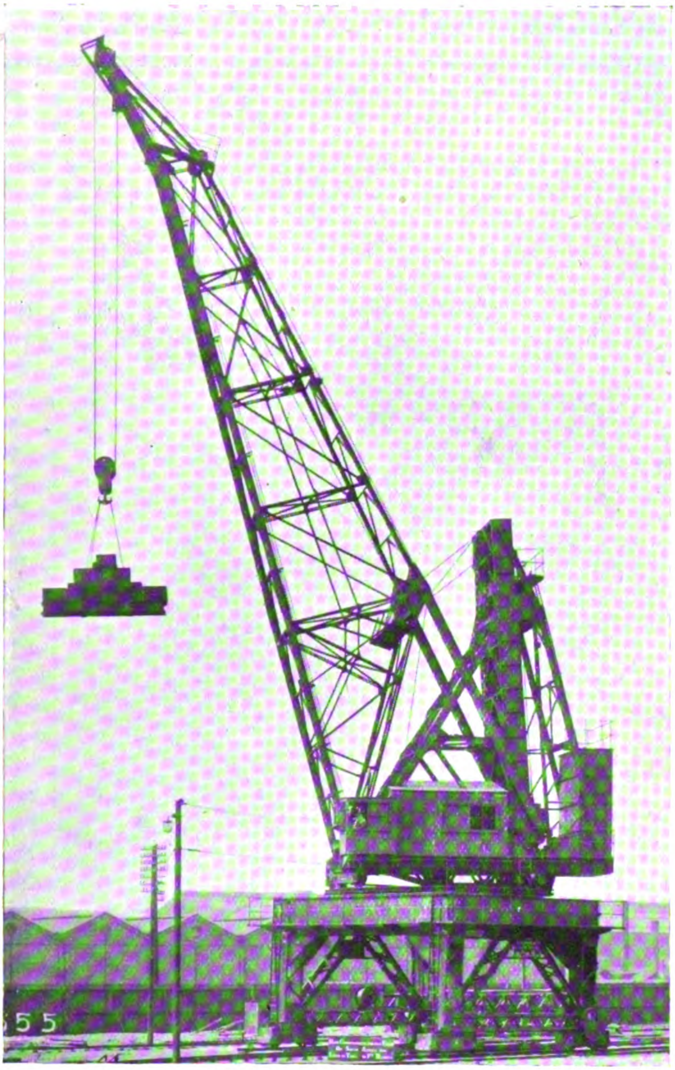

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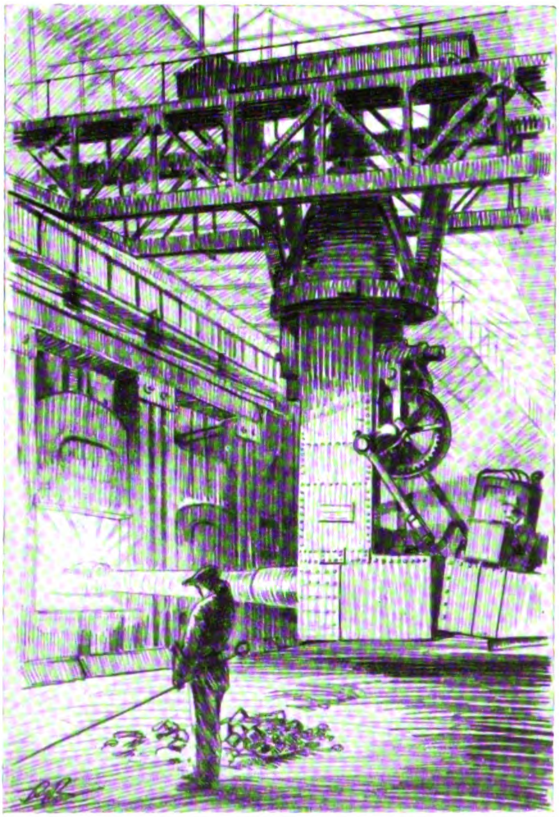

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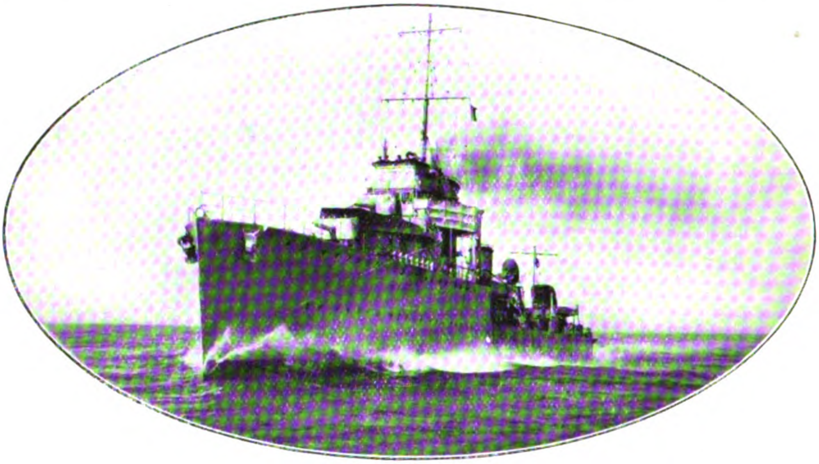

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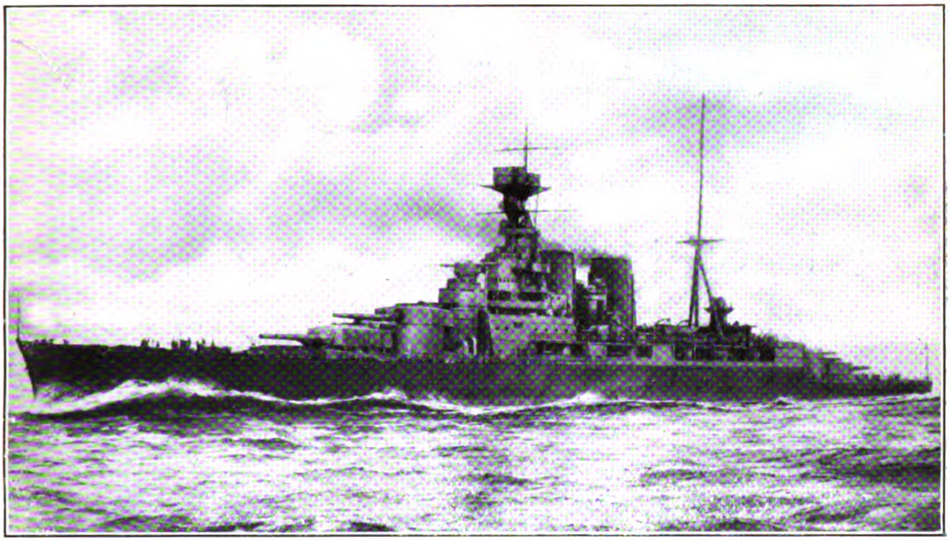

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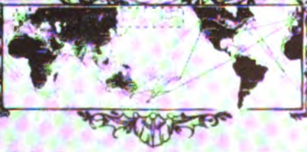

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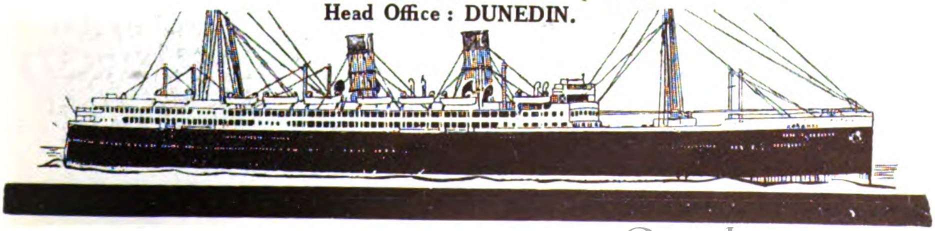

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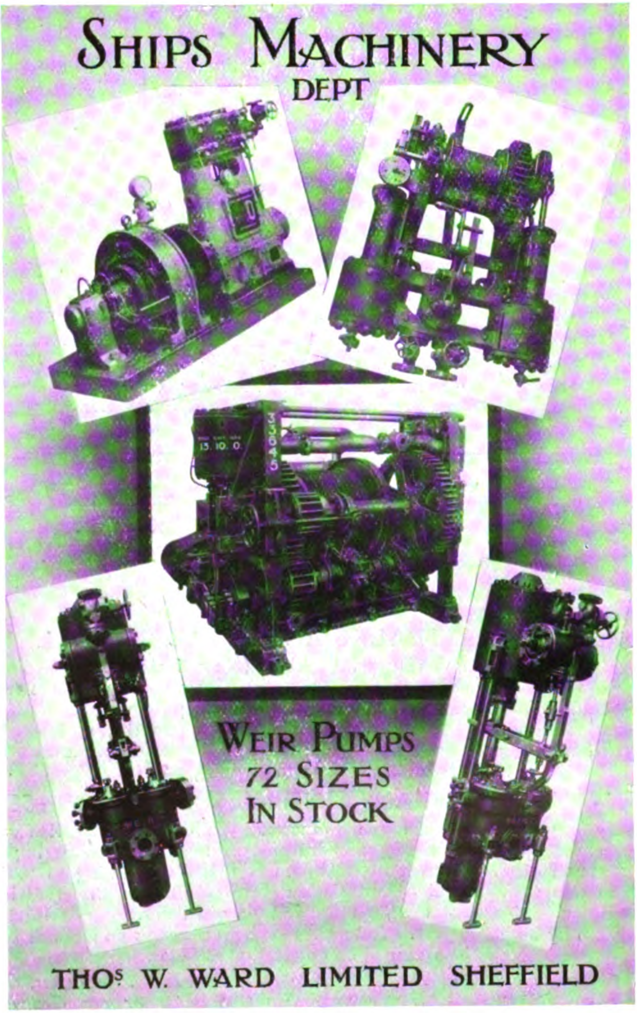

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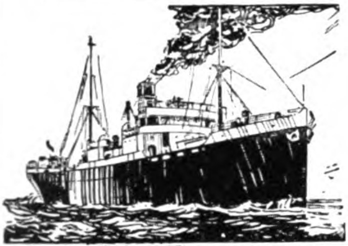

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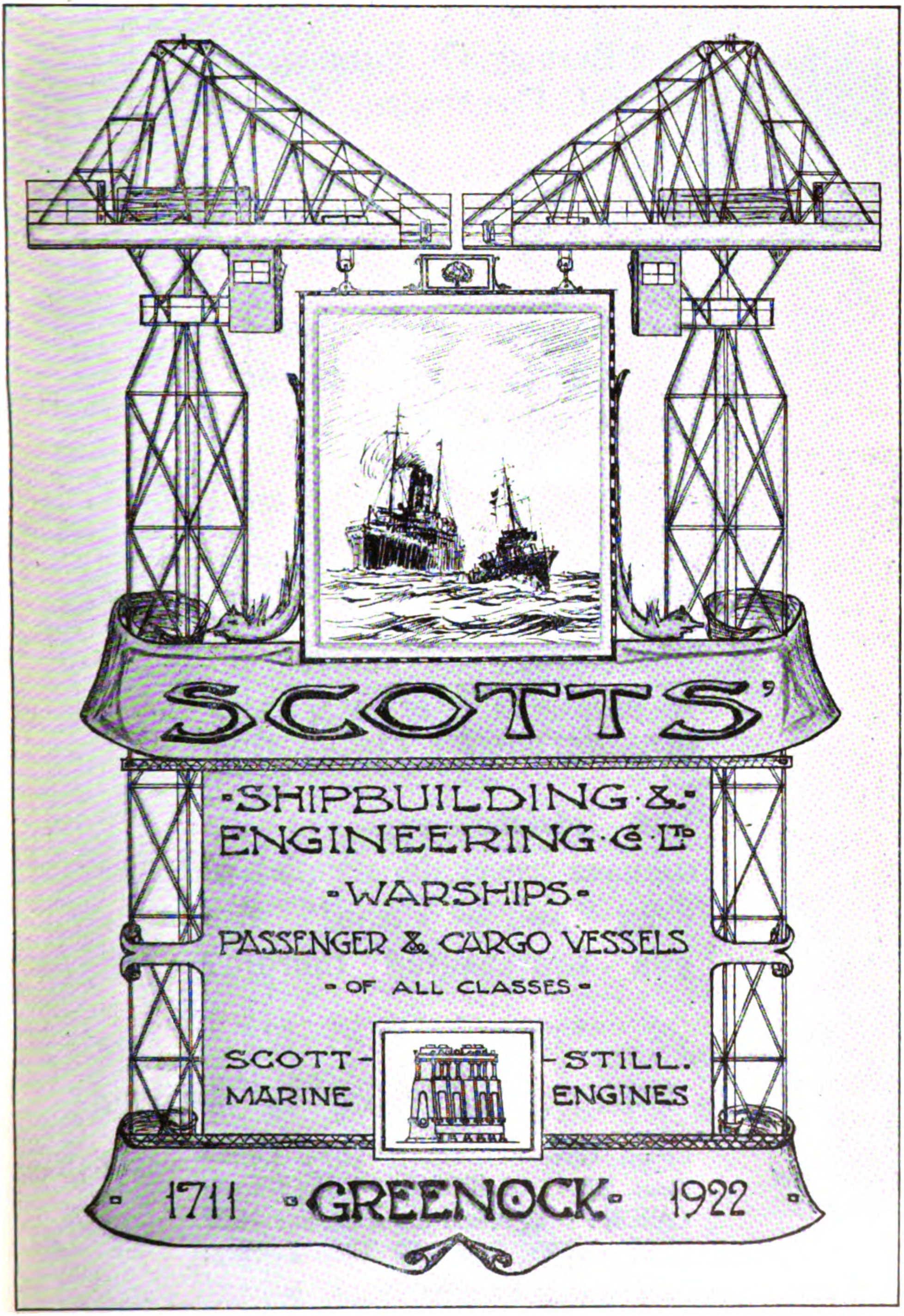

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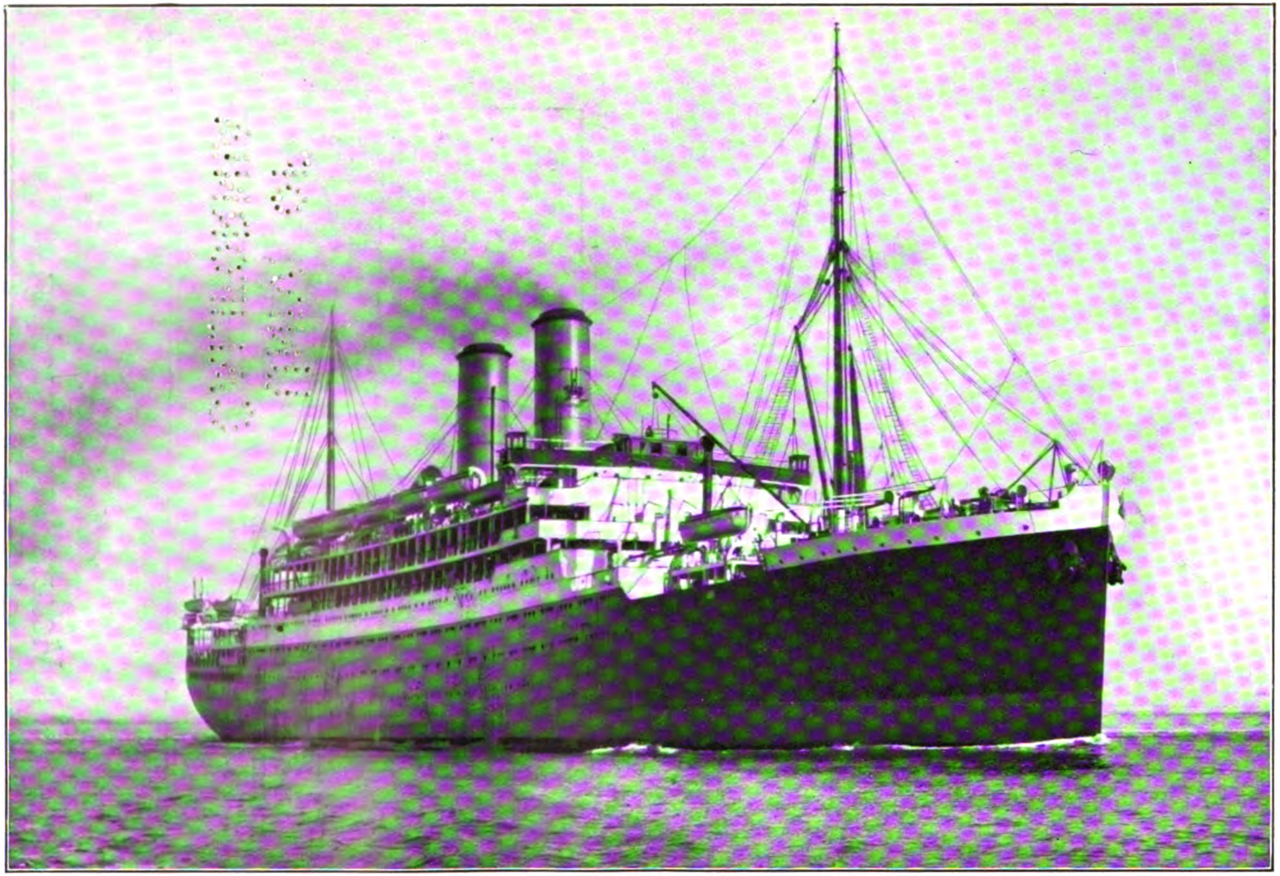

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# BRASSEY'S

# NAVAL AND SHIPPING ANNUAL.

# 1925.

EDITED BY

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# PREFACE.

THE subjects of predominant interest to all who are concerned with sea affairs, in their naval and mercantile aspects, are, on the one hand, the future of the light cruiser in view of the provisions of the Washington Treaty, and the influence of air power on sea power; and, on the other, the progress of the motor ship, the reconstruction of the German mercantile marine, and the concerted efforts of shipowners and shippers to discourage acts of flag discrimination. In this volume of "Brassey's Naval and Shipping Annual" these subjects are dealt with in chapters written by contributors of wide experience and knowledge.

In accordance with the precedent established last year, the "Annual" now consists of four main sections; the first devoted to the navies of the World, and the second to merchant shipping, with two sections consisting of warship plans, profiles of ships, and statistical information in a form facilitating ready reference. Profiles and plans are published of all the men-of-war in the world's navies, class by class, and the principal merchant ships are also represented as they appear on the horizon when met at sea. No labour has been spared to render the plans and profiles accurate in all respects, and a number of profiles of new men-of-war, as well as profiles of new merchant ships, appear for the first time in this volume, while in other cases new drawings of warships have been made in view of reconstructions which have been carried out since the "Annual" was last issued. A notable feature is the number of ships now carrying seaplanes. We have again to acknowledge our indebtedness to Mr. Arthur J. W. Burgess, R.I., R.O.I., and to Mr. F. T. Blackman, of the Royal Corps of Naval Constructors, for the great care exercised to ensure the accuracy of these plans and profiles.

As in former years, Commander C. N. Robinson contributes the first chapter to the Naval Section, in which he deals comprehensively with the progress of the British Navy and the development of the nascent navies of the Dominions, making special reference to the successful cruise of the Special Service Squadron, under the command of Vice-Admiral Sir Frederick Field. As Commander Robinson points out, though each self-governing part of the Empire enjoys complete freedom to organize its own naval defences, the British Empire has subscribed to the terms of the Washington Naval Treaty, the ratios applying to capital ships and aircraft carriers embrace the whole Empire—Dominions, Colonies, and Dependencies. In respect to these classes, therefore, equality with the United States represents the limit of expansion of the forces of the Empire as a whole, but the ratio does not apply to cruisers and other auxiliary craft. The only proviso is that no vessels of these types may exceed 10,000 tons or be armed with a more powerful weapon than the 8-inch gun.

Since the last issue of the "Annual" was published Mr. John Leyland, who for many years had written on the development of Foreign Navies with a completeness of knowledge possessed by few writers, has died, to the deep regret of many friends. Lieut.-Commander A. Colquhoun Bell, who has for many years been a close student of naval developments abroad, in his chapter on Foreign Navies, traces the course of naval events in the United States, Japan, France, and Italy, and has been at some pains to summarize the proceedings at the abortive, but illuminating, Disarmament Conference at Rome, at which all the lesser naval Powers were represented. The chapters by Commanders Robinson and Bell are supplemented by the usual Tables showing the comparative strength in all types of ships, built and building, of the principal naval Powers. It is pointed out in the introductory notes to these tables that there is no foundation for the impression which prevails in this country, as well as in other countries, that a new "race in naval armaments" has opened, so far as cruisers are concerned. Considerable activity is being displayed in building other auxiliary craft, and especially submarines: Japan is building 22, and 10 more are projected, France is building 21, and the United States 10, while only 7 are being constructed for the British Fleet. But the strength of every fleet in cruisers, except that of the United States, is declining.

This survey of the activities of various Powers in cruiser construction lends particular interest to the three chapters contributed by Sir George Thurston, Captain A. Delpierre, late of the French Navy, and Captain Dudley W. Knox, of the United States Navy. Sir George Thurston, who has written in a former issue of the "Annual" on the design of the capital ship, deals in the present volume with the design of the light cruiser. As he indicates, the naval architect of the future will have to work under the limitations as to displacement and armament fixed by the Washington Treaty; but he will, nevertheless, have considerable freedom in meeting the strategical and tactical requirements of the naval officer, differing as they do in accordance with geographical, economic, and other considerations. Captain Delpierre reflects a considerable body of French naval opinion in urging that the French Navy needs comparatively few cruisers; while Captain Dudley Knox holds, on the other hand, that the capital-ship ratio should be interpreted as applying to light cruisers.

A group of three naval officers deal in succeeding chapters with subjects which are exercising all who are watching the development of naval power. An officer of high rank examines the relationship between sea power and air power in a chapter of great topical interest in view of the reparation policy which is being pursued in this country. Captain Edward Altham, and Commander C. H. N. James, in writing on "A Well-balanced Fleet" and "Naval Bases and Fighting Power," respectively, also devote attention to the influence which man's conquest of the air is likely to have on the constitution and supply of naval forces. In what may be regarded as a complementary chapter, Air Commodore Masterman, R.A.F., discusses the commercial airship as a reserve for the Navy.

As a result of the Washington Conference, increasing interest is being taken throughout the world in the Navy of the United States, and Rear-Admiral A. P. Niblack's study of American naval policy will be read with close interest. The parents of boys who wish to become naval officers will find much useful information in the chapter dealing with the naval career, in which authoritative particulars are given of pay, prospects, and pensions.

Sir Westcott Abell, Chief Ship Surveyor of Lloyd's Register, is again responsible for an informative and lucid chapter in which stock is taken of the merchant shipping of the world. Shipowners, both in this country and abroad, will turn with high expectations, which will not be disappointed, to his review of the economic position in the principal maritime countries. Sir Westcott Abell also discusses the International Shipping Conference, which was held in London towards the close of last year, and its results, and then deals with the progress and development of each country's merchant fleet. Mr. R. W. Johnson describes the movement of freights during the past year, his figures supporting the conclusion reached by the Chamber of Shipping that international trade has recently been carried on not only without profit, but at a loss. Mr. Aylmer Vallance, General Secretary of the National Maritime Board, explains the sequence of events which led to the concession of higher pay in the British Mercantile Marine at a time when it is passing through a worse period of depression than it has ever known before.

Mr. James Richardson, who has written in former volumes on the progress of the internal-combustion engine for marine purposes, sets forth, with a wealth of detail, the latest developments in the design and construction of all propelling machinery. If full advantage is to be obtained from the economies which the advent of the motor ship promises, quick dispatch of shipping in British as well as foreign ports is essential. Recently the Chamber of Shipping appointed a committee to consider British port facilities, and investigating sub-committees toured the country. Sir Frederick Lewis, who presided over this investigation, sums up the conclusions which they reached, indicating that about £20,000,000 are now being spent in improving the port facilities.

Dr. Leisler Kiep, Director of the Hamburg-America Line, sets forth, for the first time for English-speaking readers, the course of events in Germany after the war, when practically all the seagoing ships under the German mercantile flag were surrendered to the Allies. Owing to the depreciation of the mark, German shipowners were confronted with unexpected difficulties in spite of the action of the Reich in placing a large sum, amounting eventually to 18 milliards of marks, at their disposal for building new ships. Dr. Leisler Kiep explains how these difficulties were overcome by the shipbuilders and shipowners in combination, and suggests that for financial and other reasons there can be, for the present, no further expansion of the German mercantile marine.

Considerable attention is devoted to a group of technical subjects which are exercising the minds of shipowners and shipbuilders. Mr. Charles Tennyson, Deputy Director of the Federation of British Industries, explains the attitude of far-seeing shippers of goods throughout the world, towards acts of flag discrimination, which have been adopted in several instances with a view to stimulating national shipping. As he suggests, the interest of shipowners and shippers are, if not identical, very similar in regard to all such measures. They tend to interfere with the freedom of international trade, and thus to penalize both producers and consumers. Mr. John Anderson describes some of the newest developments in ship equipment; Mr. Charles Cooper writes upon the problems of design of shallow-draught vessels for inland navigation; Captain Towler recounts some interesting experiences in the use of directional wireless at sea; and a further chapter is devoted to the subject of refrigerating machinery on board ship.

The last two chapters are of an historical character. In the first of these Mr. Thomas Rome, Chairman of the Mersey Docks and Harbour Board, traces the development of Liverpool as a port, and reveals the courage and enterprise which are still being exhibited in further developing this port, which is London and Southampton's greatest rival. Mr. E. A. Ebblewhite, a student of the history of the great Livery Companies of the City of London, traces the vicissitudes through which the Worshipful Company of Shipwrights has passed in the course of its long and useful career. Having weathered many storms and evaded not a few shoals, it is now, under the Mastership of Viscount Inchcape, in smooth water. With a large and increasing membership of shipowners, shipbuilders, and others, it is once more taking up its mission as the City company most intimately concerned with the prosperity of the twin industries and the training of their craftsmen.

We have again to express our thanks to many naval officers, shipbuilders, shipowners, and others, as well as to the naval authorities of this and other countries, for the ready assistance they have given in the preparation of this volume. Special thanks are due, as in former years, to Lloyd's Register of Shipping.

ALEXANDER RICHARDSON.
ARCHIBALD HURD.

# NAVAL SECTION.

# CHAPTER I.

## NAVAL FORCES OF THE BRITISH EMPIRE.

DURING the past year there have been four outstanding events in connection with the Naval Forces of the Empire, the inter-relation and significance of which cannot have escaped the attention of those interested in the solidarity and security of the British Commonwealth of Nations. First among them may be placed the cruise of the Special Service Squadron round the world, than which there could have been no better demonstration to the people of the Empire overseas that the Navy is the great link between them and the Motherland. Next there was the postponement, on political grounds, of the development of the base at Singapore, which naturally disturbed many thoughtful and far-seeing men of affairs in Australia and New Zealand, and about which more must be heard in the immediate future. Thirdly, there was the first great Naval Review to take place since the war, which, while it marked the climax of British sea strength in home waters in the period immediately following hostilities, also emphasized the extent to which the fleet has been reduced under the Washington Treaty and by the voluntary scrapping of ships. Then, lastly, following the Review, came the return of the principal squadrons to the Mediterranean, in accordance with the shifting of the centre of strategic moment as a consequence of the destruction of the German fleet.

All these matters have a significance from the standpoint of Imperial progress and development which deserves the earnest attention of all the British peoples. The Washington Treaty does not apply merely to the Royal Navy, but also to the Dominion naval forces, which are equally affected by the restrictions in regard to numbers and tonnage. Whereas the Royal Navy alone was formerly supreme, now all the naval forces of the Empire put together are limited to a position of equality with the United States Navy. As Vice-Admiral Field emphasized in his speeches during the world cruise, the important fact to keep in mind is the protection of the Empire's floating trade; and the question whether this can be performed efficiently and adequately is not concerned only, or even chiefly, with the relative strength of other naval Powers. Commodore Walter Hose, the Director of the Canadian Naval Service, also touched upon a cognate matter in a speech at Quebec on April 23, 1924, when he said that the Navy did not necessarily exist for the protection of territory, because if a difference should arise with some Power overseas, the oversea trade was the most vulnerable spot for an enemy to strike at. Is this fact realized by the people of the Dominions? Although they are equally implicated in the question of the defence of British trade and communications, and their statesmen have been and are ready to give a lead in the matter of co-operation, the general support for such a policy is lacking, and very little is done. Except in the case of Australia, no Dominion is at present building, or contemplating building, a vessel of war of any kind, to assist in the maintenance of that sea power which protects all alike.

## I. THE BRITISH NAVY.

### THE SPITHEAD REVIEW.

At Spithead on July 26, for the review by King George, there were assembled 193 vessels, of which, however, only twenty were battleships and cruisers. In 1914, at the last great inspection in the same anchorage, when a little over 200 craft of all kinds were present, no less than 114 were battleships and cruisers. The following comparison by types may be found interesting for purposes of record:—

| Type. | 1924. | 1914. |
|---|---|---|
| Battleships | 10 | 55 |
| Battle-cruisers | 1 | 4 |
| Cruisers and light cruisers | 9 | 55 |
| Flotilla leaders | 10 | 1 |
| Destroyers | 88 | 56 |
| Submarines | 24 | 20 |
| Aircraft-carriers | 2 | — |
| Minesweepers | 37 | — |
| Minelayers | — | 7 |
| Auxiliaries | 12 | 7 |
| Totals | 193 | 205 |

Although not in line, the minelayer Princess Margaret was present at the review, conveying official guests, making the actual total of war vessels 194. Speaking at Forres on August 27, 1924, the Prime Minister, who with other ministers witnessed the review from the Enchantress, which was placed in temporary commission, said that, as they passed through the lines of the fleet, it was quite true that those who had been there before thought the lines short, and the course brief. Nevertheless, he continued, "that shortening and brevity were a great achievement. Great Britain signed the compact of Washington and Great Britain always shall and must carry out that compact and honour that signature." The fleet was commanded by Admiral Sir John M. de Robeck, and in a message to the Commander-in-Chief after the ceremony King George said: "It is with much pleasure that I have inspected the fleet under your command, and I am especially glad to have had the opportunity of doing so before you hauled down your flag at the end of your long and distinguished career afloat." Sir John was succeeded in command of the fleet on August 15 by Admiral Sir Henry Oliver, from the office of Second Sea Lord.

## Fleet Re-Distribution.

One other outstanding event of the year, the transfer of certain squadrons and flotillas from the Atlantic to the Mediterranean, was foreshadowed in the 1924 " Annual," and was announced by the First Lord in his Estimates Memorandum reprinted in the appendix. The Mediterranean fleet was increased from six battleships to eight, from one light cruiser squadron to two, from two destroyer flotillas to four, with additional depôt-ships and aircraft-carrier, and a submarine flotilla was also added to it. The first of the units transferred left their home ports for Malta in September. These were the battleships Queen Elizabeth, Barham, Malaya, and Valiant, and the aircraft-carrier Hermes. About the same time the Second and Fifth Destroyer Flotillas, accompanied by the Coventry (flagship of the Rear-Admiral (D)) and Greenwich, also left ; and the Second Submarine Flotilla was ordered to leave in January, 1925. The cruiser squadron selected for transfer was the First, which did not return from the world cruise until September 29, and in this squadron the Frobisher, which commissioned on the same date, succeeded the Delhi as flagship. These changes, of course, made the Mediterranean fleet the strongest in commission, as it was until the first of the reorganization plans of Lord Fisher came into operation in 1904 with the object of building up gradually a fleet for the North Sea. Now there is resumed the historic distribution of the Navy, and there can be no doubt that this disposal of our squadrons abroad is of more consequence to us to-day even than it was to our forefathers. The Dominions are equally concerned with ourselves in the arrangements by which it is sought to cover the strategic centres and protect the trade routes. They should note that while a transfer of force to Malta has been effected easily and smoothly, this is the limit of movement which is permitted by existing base facilities. If danger threatened further East, while the ships might go through the Suez Canal, they could only be supported in the waters of the Indian Ocean or the Pacific by improvised arrangements, elaborate and costly, which might well be impossible in war time ; in any case, the vessels would have no docks or repair bases to go to if damaged. The matter was well summed up by the Australian Prime Minister in replying to the request for the views of the Commonwealth on the Singapore scheme, when he said :

> We believe that the existence and prestige of the British Empire has been, and is, the greatest factor in the maintenance of the peace of the world.
>
> To the active support backed by the prestige and strength of the British Empire has been due the measure of success which has been achieved by the League of Nations since its inception.
>
> Our strength relative to the other great Powers has been the basis of the influence for peace which we have wielded in the councils of the nations and through the League of Nations.
>
> That strength has depended mainly on the British Navy, its power and mobility. We are convinced a base in the Pacific is imperative for that mobility. The existence and prestige of the Empire will be imperilled without it.

## Admiralty Changes.

On the change of Government in January, 1924, the post of First Lord of the Admiralty, in the Administration formed by Mr. Ramsay

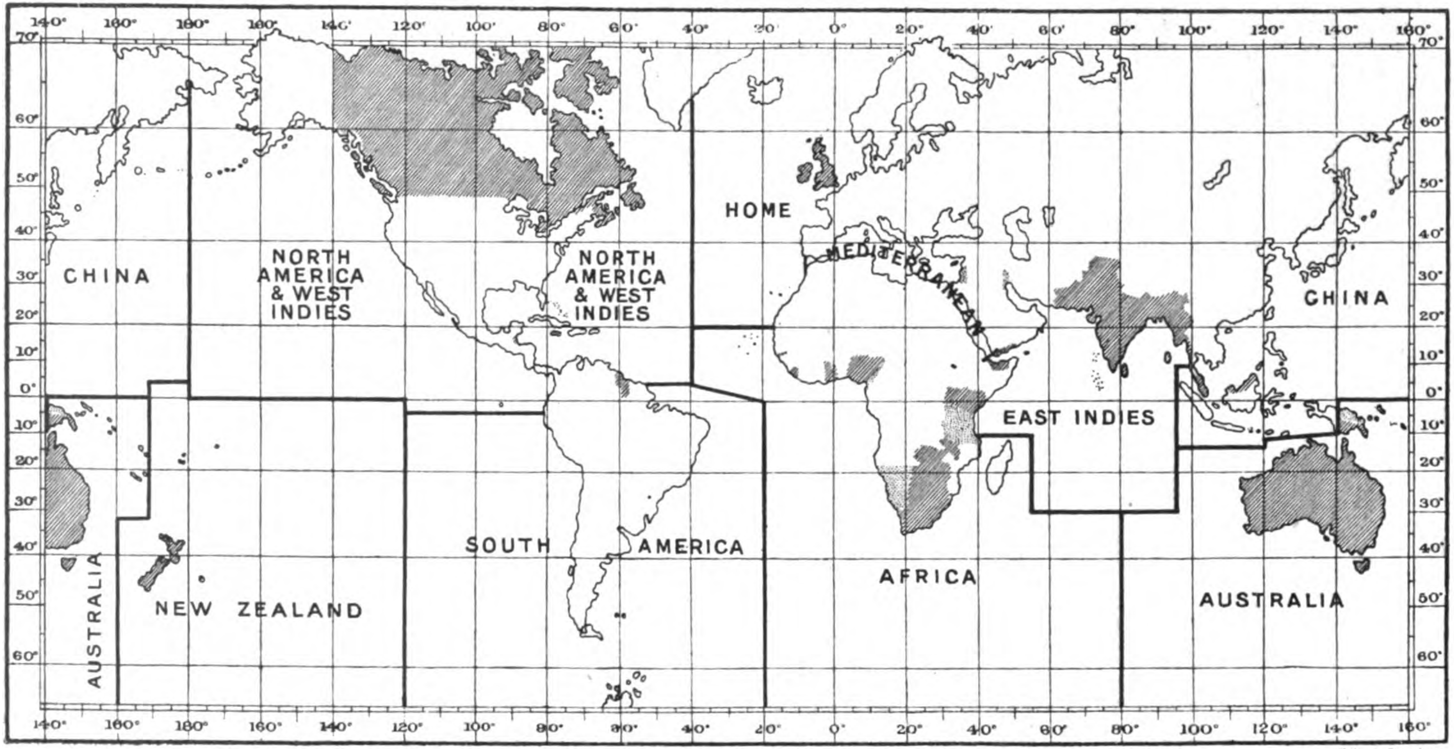


CHART SHOWING LIMITS OF BRITISH NAVAL STATIONS.

*(The British Empire is shown by ruling and the Mandatory Territory of the British Empire by stippling.)*

MacDonald, was offered to and accepted by Lord Chelmsford, late Viceroy of India. In a personal explanation in the House of Lords on February 12, Lord Chelmsford stated that, on his being approached, he made perfectly clear the conditions under which he would take office. He came in not as one who took the Labour view, but as one who was detached from politics, and who was prepared as a colleague to help to carry on the King's Government on a disclosed programme. It was on the great principle that the King's Government must be carried on that he found himself able to come in and assist. Mr. C. G. Ammon, formerly Organizing Secretary of the Union of Post Office Workers, was appointed Parliamentary Secretary to the Admiralty, and Mr. Frank Hodges, formerly Secretary of the Miners' Federation of Great Britain, Civil Lord. With reference to certain suggestions which had been made as to the attitude of the Sea Lords towards the new administration, Mr. Hodges, in the Navy Estimates debate, repudiated these reflections, stating that he had never met any criticism, any suspicion of disloyalty on the part of the officers concerned. They had shown the most marked loyalty and the keenest desire to see that the Government's policy, whatever it might be, was carried out to the fullest extent.

In accordance with present practice, which contrasts with that which obtained until about forty years ago, the new Cabinet retained the same naval advisers as had served under their predecessors, and the only changes in the composition of the Board since made have been those caused by ordinary routine of service. On August 15, 1924, Vice-Admiral Sir Michael Culme-Seymour, who had relinquished in May the post of Commander-in-Chief on the North American Station, became Second Sea Lord in succession to Admiral Sir Henry Oliver, who after nearly four years' arduous work on the Board, a period which had included the unprecedented reductions in personnel following the Geddes Report and the Washington Treaty, was appointed Commander-in-Chief of the Atlantic Fleet. Earlier in the year, on April 1, Rear-Admiral John D. Kelly had joined the Board as Fourth Sea Lord, in succession to Rear-Admiral the Hon. Sir Algernon Boyle, who had also served with great success for four years. There were no important changes in the organization of the Admiralty departments during the year under review. It is to be noted, however, that the reductions in the total staff have been less than were anticipated, and that the Admiralty office vote for 1924–25 was still well over a million sterling—viz. £1,229,500, a reduction of only £50,900 on that of the previous year, and more than two and a half times as much as the sum voted in 1914–15, viz. £483,500. No less than £247,572, or more than half the entire cost of the office ten years ago, is now required for the Civil Service bonus.

## NAVAL CONSTRUCTION.

The outstanding event in a survey of the progress of British naval construction is the change in the head of this branch. Sir Eustace Tennyson d'Eyncourt, who became Director of Naval Construction on August 1, 1912, in succession to Sir Philip Watts, retired from office on December 31, 1923, although he is continuing to act in an advisory capacity in regard to those vessels for the designs of which he was responsible. Sir Eustace has done very great work indeed for the Royal Navy. His talents and industry were manifested in the vessels built immediately before the war—the Royal Sovereign battleships, the "C" class light cruisers, the "M" and later destroyers, and various types of submarines; in the unprecedented output of ships of all kinds, including several of altogether novel types, during the war; and in the first war craft to be designed for the post-war era, in the light of the experience of actual fighting. There were added to the Navy during the war period no less than 842 vessels, ranging from 15 battleships to 83 coastal motor boats, and from 38 monitors to 146 submarines. Sir Eustace, moreover, was responsible for the designs of the rigid airships until the autumn of 1917, so that all the vessels of this kind actually used in the war were planned under his direction. He also took a prominent part in the evolution of the tanks for land fighting, and in the adoption of the bulge method of under-water protection of battleships against torpedo explosion.

It was a source of satisfaction to the Naval Service, and particularly the Royal Corps of Naval Constructors, that the Admiralty selected the successor of Sir Eustace from among the ranks of the latter instead of going, as on the last three occasions, to one of the great shipbuilding firms. Mr. W. J. Berry, C.B., had been Director of Warship Production since 1917, and from 1912 to 1917 was the senior Assistant Director of Naval Construction. He was therefore next in charge of the Constructive Department throughout Sir Eustace d'Eyncourt's period, and conversant with his policy and practice. He joined the Royal Corps in 1887, and has been continuously employed under the Admiralty ever since. In 1907–12 he was Chief Constructor at Malta Dockyard. His talents and capacity are fully recognized both by naval officers and by those in his own profession, and his selection as Director commanded general approval. The importance of the post cannot be overestimated. Mr. Churchill remarked in the House of Commons at the time Sir Eustace d'Eyncourt was appointed that the task of filling the appointment had been the most difficult in the region of patronage which he had had to discharge since he took office. The subordinate posts affected by Mr. Berry's promotion were also filled from within the R.C.N.C. Mr. E. A. J. Pearce, O.B.E., formerly Deputy Director of Dockyards, became Director of Warship Production in place of Mr. Berry; and Mr. J. J. King-Salter, Constructive Manager at Rosyth, was appointed Deputy Director of Dockyards.

### CONTRACT SHIPBUILDING REVIVAL.

With the resumption of construction for the Royal Navy in the private shipyards, it was necessary to revive the office of Captain-Superintendent of Contract-Built Ships, which lapsed after the war. Captain H. A. Buchanan-Wollaston, C.M.G., took up the duties on January 1, 1924, assisted by a shipwright-lieutenant, and on

February 8 two more lieutenants, R.N. (ex-gunners), were added to his staff. In 1914, of course, there was a larger organization owing to the much greater amount of contract shipbuilding in progress, and there were three Captain-Superintendents, one responsible for work on the Clyde, another for the Tyne, Thames, Mersey, Barrow, and Sunderland, and a third for destroyers building by contract.

The progress made on the two new battleships Nelson and Rodney, laid down, in accordance with the terms of the Washington Treaty, on December, 1922, by Messrs. Armstrong, Whitworth & Co., and Messrs. Cammell Laird & Co., has been retarded by the boilermakers' lock-out during 1923, and it is very doubtful whether the valuable time thus lost can be regained during the remaining contract period. The Admiralty have not yet seen fit to issue details as to the construction, armament, and equipment of these vessels, and therefore it is premature to discuss the reports that they will have nine 16-in. guns in triple turrets, and will not be fitted with bulges. The latter statement was made by Sir Philip Watts at the spring meeting of the Institution of Naval Architects in April, 1924. What is essential, Sir Philip remarked, is that the vessels should have sufficient stability to remain upright as various compartments became flooded. All possible protection against injury must be provided, but there may come a time when the protection will fail, and only a reserve of stability can save the vessel. In reporting Sir Philip's remarks on this subject, *Engineering* stated, on page 472 of vol. cxvii., that the pre-Dreadnought battleships had insufficient stability and in most cases capsized from the flooding of a single large compartment. A number of vessels were lost in this way, due to both gunfire and torpedo attack. Continuing, the report stated :

> The Dreadnoughts had insufficient stability and subdivision to be reasonably safe against the flooding of compartments by the explosions of at least two torpedoes in any position. Many of them were damaged by gunfire and torpedo attack, and some had compartments flooded by gunfire or torpedo attack, but got away and were repaired. Actually none were lost through flooding of the compartments.
>
> In the Royal Sovereign class there was unfortunately a return to the old methods of giving ships insufficient stability for the purpose of making them steadier gun platforms. Bulges were added to correct this, and have been added to two ships, the Royal Sovereign and the Royal Oak, since the termination of the war. As completed, the vessels of the Royal Sovereign class had rather more stability than they would have had if given sufficient beam originally.
>
> There was no material advantage in giving bulges to a new ship. This constituted a return to the "tumble home," which was given to wooden ships for structural purposes, and was continued by the French for some time after wooden ships had been replaced by iron ones. In some cases there was not much harm in it, but it was both ugly and inconvenient. The monitors were made very bad sea boats by their application.

## LIGHT CRUISER BUILDING.

The past year has been notable for the resumption of light cruiser construction after the six years' break following the armistice. The last light cruiser to be laid down prior to this resumption was the Emerald, at the Armstrong Whitworth yard, in September, 1918, three months after her sister, the Enterprise, was begun at the Clydebank establishment of Messrs. John Brown & Co. It was, however, about the end of 1917 that the design of these vessels was sanctioned, so that, although still uncompleted, they cannot be regarded as post-war cruisers any more than the Hood is a post-war capital ship. Meantime, almost all the other naval Powers, certainly the leading countries, had begun to build, within the fairly wide limits of the Washington Treaty, cruisers embodying the experience of the struggle, and the suspension of battleship building has invested this class with a relatively greater importance than before. Had it not been for the large war output of cruisers, the resumption of building work in this class must of necessity have been undertaken sooner. Even as it is, while the war programmes furnished us with a certain number of ships, those ships were not of the type which will be required in a future war, either for the protection of commerce in the outer seas or for attendance on the battle fleet operating at great distances from its bases.

In a speech at Plymouth on October 25, 1923, Mr. Baldwin, then Prime Minister, made the first announcement that the Government had decided to lay down several light cruisers, to replace the County class, which replacement was many years overdue. In his election address, issued on November 17, he said that " a substantial proportion of the seventeen light cruisers required during the next few years would be laid down as soon as the designs were ready." The programme of the late Government was further elaborated by Mr. Amery, then First Lord, in the House of Commons on January 21, when he said that practically the whole of our present light cruisers would be obsolete and worn out in the course of the next twelve years. To replace them, and maintain our cruiser establishment at strength sufficient to meet the requirements both of our fleets and of the protection of our commerce, we should have to lay down in the course of the next ten years a total of some fifty-two cruisers in all—an average, in other words, of five a year. There would be a particularly heavy drop in the next six years, and to prevent a serious deficiency arising in 1929 and subsequently we ought to lay down as many above that average as we reasonably could in the immediately ensuing three years. After dealing with other reasons of administrative efficiency and economy in favour of expediting the cruiser programme, Mr. Amery announced that the Government proposed to lay down immediately eight light cruisers within the limits of the Washington agreement—10,000 tons and 8-in. guns.

## TORPEDO CRAFT AND AUXILIARY PROGRAMME.

There were other vessels in the programme which the Conservative Government had put forward with a view of relieving unemployment in the great shipbuilding centres, the list including three submarines, a submarine depôt-ship, two destroyers, a destroyer depôt-ship, two gunboats, a special ship for the Persian Gulf, an aircraft carrier, and a minelayer, making, with the cruisers, a total of twenty vessels. Owing to the political crisis which resulted in the advent of the Labour Ministry, this programme did not get beyond the paper stage. In reply to a question in the House of Commons on February 21, 1924, Mr. Ammon, the new Parliamentary Secretary to the Admiralty, said that the Government had decided, in view of the serious unemployment, to proceed with the laying down of five cruisers, three of which would be built in the royal dockyards, and two destroyers. Owing largely to a misunderstanding, a body of supporters of the Government, who feared that this shipbuilding was to be started before the House had been given an opportunity of discussing it, and before the cost had been voted, obtained leave to move the adjournment to call attention to the subject, and the occasion was made notable by a speech of the new Prime Minister, the first in which he had defined his policy in regard to naval defence. Mr. MacDonald said :

> There is no increase in our naval strength if we begin building these five cruisers this year. The cruisers are purely for the purpose of replacement. Fifteen years is, I am informed, the life of a cruiser, and of those now in commission ten are practically dead. Seventeen more will be over fifteen within the next five years. Are we going to be told that the method of bringing about disarmament and of carrying out the pledges given by the Chancellor of the Exchequer and myself is to allow the Navy to disappear by wastage from the bottom ? I have withdrawn nothing that I have said about my feeling that the nation which trusts to armaments is bound to be deceived, but what a magnificent conception of pacifist principles must be held by hon. members who smile at the suggestion that the very worst way to carry out that pledge is to allow your ships to fall to pieces ! That is not my way and never will be.

When, a month later, the Navy Estimates were introduced into the House of Commons, an amendment was moved from the Liberal benches that " the proposed construction of five new cruisers is not justified either on the ground of relieving unemployment or of providing for the naval needs of the Empire, and is calculated to increase competition in armaments." This motion was lost by 304 votes to 114. On April 26, the Secretary of the Admiralty announced the allocation of the new cruiser orders.

## Distribution of Contracts.

In making the first announcement of the proposed shipbuilding, at Plymouth, Mr. Baldwin referred to the fact that, grave as was the distress in the other shipyards, he thought perhaps that Barrow and the Clyde had suffered most, and hoped it might be possible to see that work went there. This hope was realized when tenders came to be examined, as of the two vessels put out to contract, Messrs. Vickers Limited secured for their works at Barrow-in-Furness the order for one hull and machinery ; and the Fairfield Shipbuilding and Engineering Company, Ltd., of Govan, Glasgow, the contract for the hull and machinery of the second. The Vickers works, where formerly so many vessels of the Royal Navy were constructed, and where four battleships and light cruisers, apart from smaller craft and vessels for foreign governments, were in hand simultaneously in the summer of 1914, had not received an order for a warship since the Diomede was allotted to them in March, 1918. Similarly the Fairfield Company, which also were in the habit of turning out several ships regularly for the fleet before and during the war, had not been engaged upon a man-of-war since the building of the Despatch, which was also ordered in March, 1918. Both the Diomede and Despatch were taken to Portsmouth and Chatham respectively after being launched in 1919, and for nearly five years the resources of the firms for warship production had lain stagnant and unused. Only those actually acquainted with the conditions of the warship building industry can realize what this inactivity meant in relation to our naval position. It was, therefore, a welcome decision that was announced in February, 1924, even though the number of new vessels was less than that which had been fixed by the Conservative Government in the previous autumn.

### PROPELLING MACHINERY ORDERS.

The contracts for the machinery of the three cruisers allocated to the public dockyards at Chatham, Portsmouth, and Devonport were awarded respectively to Messrs. Hawthorn, Leslie & Co.; Messrs. Parsons Marine Steam Turbine Co.; and Messrs. Beardmore & Co. A certain amount of influence was exerted by the dockyard Members of Parliament to secure these orders for the public establishments, but the authorities very wisely refused to depart from the practice of many years' standing under which such work is placed in the hands of private firms who specialize in marine engineering. While the Government yards have modern and well-equipped engine factories and boiler shops, and efficient staffs to operate them, their equipment is more adapted for repair work, of which there must always be a considerable quantity, and they could not, therefore, undertake expeditiously and economically the construction of the propelling machinery of a group of new cruisers. Even if this were not so, it would be a short-sighted policy to place all such work within the public yards and neglect entirely the private establishments, whose resources have stood the country in such good stead during recent years. Without some encouragement, these resources must necessarily dwindle to vanishing point, and with them the means of maintaining or reinforcing our naval power, upon which we have been able to count in the past.

Names for the new cruisers were announced on May 15. Since they are to replace the old County class, they are named in the same way. Chatham Dockyard is to build the Kent; Portsmouth, the Suffolk; Devonport, the Cornwall; Messrs. Vickers, the Cumberland; and the Fairfield Company, the Berwick. The influence of the history of the recent war is seen in the dropping of certain names which might otherwise have received preference, such as that of Hampshire, an appropriate name for a Portsmouth ship, but one which recalls memories of the struggle which, for a time at any rate, are best forgotten. Perhaps the most famous of all the sixteen names in the old County class was that of Monmouth, but the vessel so named was lost at Coronel. The revival of a series of County names ought to stimulate the local and national interest in the ships of the fleet, and the plan is certainly as suitable as any which could be found for cruiser nomenclature. There is no lack of names in this connection, for even if all the fifty-two cruisers mentioned by Mr. Amery were built within the next ten years and all took their names from this source, there would still be a number of counties unrepresented in the fleet.

## New Destroyer Contracts.

Contracts were placed in June for the two destroyers provided for under the Navy Estimates. One was allotted to Messrs. Yarrow & Co., Scotstoun, to be called the Ambuscade, and the other to Messrs. Thornycroft & Co., Woolston, to be called the Amazon. Remembering that these firms built the first of British destroyers, in 1893—Yarrow's the Havock and Hornet, and Thornycroft's the Daring and Decoy—it is fitting that the resumption of destroyer building after the war should be allocated to them.

The destroyer phase of the replacement problem is quite as important as that appertaining to light cruisers. In reply to a question in June, 1924, Mr. Ammon stated that on the basis that the useful life of a destroyer is twelve years, and that in the case of British destroyers one year's war service is equal to two years' peace service, the destroyer strengths at that date were: British Empire, 197; United States, 279; Japan, 74. On the assumption that existing programmes authorized and projected will be completed, and taking no account of possible future programmes, the destroyer strengths on April 1, 1929, will be: British Empire, 119; United States, 262; Japan, 82. Thus in less than five years from now we shall be able to count on only half as many vessels of this vitally important type as America, and only a few more than Japan.

## War-Time Cruiser Programmes.

It is a great pity that lack of the necessary financial provision has so greatly retarded the building of the cruisers laid down in the later stages of the war. When the Frobisher was completed in September, 1924, after being in hand for over eight years, there still remained under construction the Effingham, laid down at Portsmouth in April, 1917; and the Enterprise and Emerald, begun by Messrs. John Brown & Co. and Messrs. Armstrong, Whitworth & Co. in June and September, 1918, respectively. The Effingham and Emerald are expected to be ready for service by the end of May, 1925, and the Enterprise in July, 1925. All three are to go to the East Indies Station when ready for service. Not only is this protracted building very costly in the long run, but it deprives the fleet of the use of important vessels for a considerable period of their effective life. Although motives of economy were responsible, the result is far from economical; it is, on the contrary, very wasteful. Mr. George Lambert, M.P., pointed out in the Navy Estimates debate that there could be no greater extravagance than such a case as the Frobisher, under construction for eight years. No private shipbuilder would attempt to carry on work on a ship so slowly and so long, unless he was prepared to go into the Bankruptcy Court. In no other country—except Russia—have such conditions obtained, even during the financial stringency which has followed the war.

## Torpedo Craft Progress.

Other instances of retarded construction are afforded by the flotilla leaders Broke and Keppel; the destroyers Shikari, Whitehall, and Witch; and submarines L.23, L.26, L.27, L.53, and L.54. The first-named pair were begun in the autumn of 1918 by Messrs. Thornycroft, and were withdrawn from that firm soon after their launch in 1920, at the time when all unfinished vessels in the private yards were transferred to the Government establishments. After laying idle at Portsmouth, they were ordered to Pembroke to be completed there, and not until the autumn of 1924 were they ready for sea, being allocated to the Mediterranean. Designed by the Thornycroft firm, these vessels, although of the same general type as the Admiralty leaders, have certain differences of detail. They are of 1,750 tons displacement, as compared with 1,800, and have a length of 318¼ ft., as against 320 ft., the breadth and mean load draught being the same in both classes, 31¾ ft. by 12 ft. 4 in. But with the same horse-power, 40,000, the Thornycroft vessels are good for 32 knots at trial draught, with deep load, smooth water, and clean bottom, as compared with 31 knots in the Admiralty design. The armament consists of five 4·7-in. guns and one 3-in. anti-aircraft gun, with two 2-pdr. pom-poms, and two triple torpedo tubes.

In this connection, the distinction between a flotilla leader and a destroyer is somewhat difficult to make. The 1924 issue of the official Return of Fleets allocates no flotilla leaders, either built or building, to the United States or Japan; but these Powers have a number of destroyers of 1,215 tons and 1,345 tons respectively, as compared with which the flotilla leader list includes, under Italy, a couple of Ansaldo boats, finished in 1915, of only 897 tons. Generally, however, the flotilla leaders are over, and the destroyers under, 1,500 tons displacement. The heaviest completed leaders, with the solitary exception of the ex-German V.116 (now the Italian Premuda), which is of 2,290 tons, are the British vessels of the "Scot" class, the Bruce, Campbell, Douglas, etc., which are of 1,800 tons and 40,000 horse-power, armed with five 4·7-in. guns, but heavier craft are in hand for France and Italy. France has the six Jaguars, of 2,362 tons, 50,000 horse-power, and six 5·1-in. guns; and Italy the Leone, Tigere and Pantera, of 2,165 tons, 50,000 horse-power, and eight 4·7-in. guns, with accommodation for sixty mines. These are types which deserve attention, and it would not be surprising if before long they made their appearance in the American and Japanese navies.

## DESTROYERS AND SUBMARINES.

With the commissioning, on July 19, 1924, of the Whitehall, at Chatham, for service in the Fourth Flotilla, Mediterranean Fleet, in place of the Wolsey, the last of the destroyers of war-time programmes was completed. The Shikari had been commissioned in March at Chatham, as tender to the target-ship Agamemnon; and the Witch in April, at Portsmouth, to relieve the Woolston in the Fourth Flotilla. The Shikari, Witch, and Whitehall were the last vessels of the Admiralty "R" class, the Thornycroft "W" class, and the Admiralty modified "W" class, respectively, all of which have been described in past issues of the "Annual." With a displacement of 1,075 tons, and armed with three 4-in. guns, one 2-pdr., and two double torpedo tubes, the Shikari realizes 36 knots at full power —27,000 S.H.P. In the Witch and Whitehall, there is a much heavier armament—four 4·7-in. guns, two 2-pdrs., and two triple torpedo tubes. The Witch, with a displacement of 1,350 tons, steams 35 knots with 30,000 S.H.P.; the Whitehall, which is of 1,325 tons, obtains 34 knots with 27,000 S.H.P. Great as is this engine-power, it is exceeded by recently completed Japanese destroyers, which, with a displacement of 1,345 tons, were designed for 38,500 S.H.P., although the legend speed is only 34 knots.

Progress in regard to submarines remaining over from war programmes has been even slower than was anticipated a year ago. Instead of two vessels, L.26 and L.27, remaining over into the financial year 1924–25, there were five, of which one, L.26, will not be finished until the next financial year, 1925–26. The later "L" type boats—those numbered over 50—have two 4-in. guns instead of one, and six torpedo tubes, earlier vessels having either four or six. Three of the class, L.14, L.17, and L.25, have, in place of any 4-in. guns, an armament consisting of sixteen mines, in conjunction with four torpedo tubes.

A notable voyage was undertaken during the year by the latest submarine of the "K" type, K.26, which was commissioned at Chatham on May 19, 1923, and attached to the Submarine School at Portsmouth. Commanded by Commander G. P. Thomson, O.B.E., she left Portsmouth on January 2 for Gibraltar and Malta, where she arrived on January 14, and where special ventilating devices were fitted to her for the passage through the Red Sea. Her cruise in these waters was evidently satisfactory, for it was subsequently extended to Colombo and Singapore, at which places she arrived respectively on April 29 and May 14. She left Singapore on June 10 to return to England, and arrived at Portsmouth on August 12. K.26 was, at the time of her cruise, the largest and heaviest submarine in service in any navy.

## New Submarines.

Submarine X.1, referred to in last year's "Annual," was commissioned for trials in December, 1923, by Commander (now Captain) R. H. T. Raikes, D.S.O. Further trials were begun on June 2, 1924. No authentic information has yet been published concerning the performances of this, the largest and heaviest submarine in the world. Her displacement when submerged, 3,600 tons, is nearly as great as that of a light cruiser of the early "C" classes. She has been credited, moreover, with the speed of a light cruiser—over 30 knots on the surface—and a light cruiser armament of six 5·5-in. guns, but the former is extremely unlikely. The fact that she has a crew of a hundred officers and men is in itself an indication of her powers in some direction of war-worthiness. The "K" boats have a complement of 54; the "L" type of 38; and the three submarine monitors of the "M" class, of 65. The submarines with which the Navy fought the greater part of the war had not more than thirty officers and men in their crews.

A return to smaller dimensions has been made in submarine O.1, being built at Chatham, which will be of 1,480 tons on the surface, and 1,750 tons submerged, or somewhere about the tonnage of the "J" class which were presented to Australia in 1919, and have now been scrapped.

### Aircraft-Carriers.

The Air Arm of the Fleet made good progress during the past year. Apart from the new arrangement with the Air Ministry, referred to elsewhere, the number of aircraft-carriers in commission was increased by the addition of the Hermes and Eagle. The Hermes, the first aircraft-carrier to be designed and built as such, was commissioned at Devonport on February 19, 1924, and joined the Atlantic Fleet, in which the Argus was already serving. The Eagle, after her extensive alterations, was commissioned at Portsmouth on February 26, 1924, and leaving about three months later, arrived at Malta on June 7 to join the Mediterranean Fleet, in place of the smaller carrier Pegasus. The last-named was retained in service, and in April arrived at Singapore for special duties. The Furious, first completed in July, 1917, but which has only put in three years and nine months' service in commission, continues in dockyard hands at Devonport, and will not be ready until the spring of 1925. A start was made with the conversion of the cruisers Courageous and Glorious, originally called light battle-cruisers, into aircraft-carriers. The Courageous, formerly flagship of the Reserve Fleet, was relieved by the Centurion in April, 1924, and taken to Devonport for conversion; the Glorious, formerly parent ship of the Reserve Fleet at Plymouth, paid off on February 14, 1924, and was taken to Rosyth for her reconstruction.

### New Surveying Ships.

Among several miscellaneous jobs carried out by the dockyards during the year has been the conversion of two new surveying ships, the Herald (ex-Merry Hampton) and the Ormonde, both war-time minesweepers. The Herald was commissioned at Devonport on December 17, 1923, by Commander J. R. Harvey to replace the Fantome in Australia, the latter being placed on the disposal list at Sydney. The Ormonde was commissioned at Devonport on March 3, 1924, by Captain H. P. Douglas, C.M.G., to replace the Mutine on the North American Station, the latter having returned to Devonport at the close of the 1923 surveying season, being paid off on October 11, 1923. The Ormonde left Devonport on March 17, 1924, for Port of Spain, Trinidad. With her entry into service, all the surveying ships have been replaced since the war, with the exception of the Endeavour, which is the most modern of the old type vessels, having been built by the Fairfield Company in 1912. She is now employed on the West Coast of Africa.

### The Fleet Air Arm.

An important achievement of the past year in regard to the administration of the forces of the Royal Navy has been the agreement between the Admiralty and Air Ministry respecting the working of the Fleet Air Arm. By an order dated April 25, 1924, volunteers were called for from amongst naval officers to be attached to the Royal Air Force for training in fleet air work. In the main, they will be of the executive branch, but a small number of (E) officers and Royal Marine officers will also be taken. The object is that, if sufficient volunteers are forthcoming, as seems very likely now that their future in the Royal Navy is safeguarded, 70 per cent. of the pilots and all the observers, both for fire control and reconnaissance in fleet aircraft, will be naval officers. They will retain their naval uniform, and will not be employed on work unconnected with the Sea Service without their own consent. Air work is now regarded as good service for promotion in the Navy, and as an earnest of the importance attached to it, the Board promoted, in the midsummer list of 1924, Lieutenant-Commander E. T. R. Chambers to the rank of commander, in view of the special experience of this officer in naval air work, although he was beyond the normal promotion zone. The first group of officers selected for training began duty on June 16, 1924, at No. 1 Flying Training School at Netheravon, Salisbury, which has been specially allocated for this initial instruction of officers for the Fleet Air Arm. Subsequently, it was decided to replace by naval ratings and marines certain of the Royal Air Force personnel employed in the aircraft-carriers—shipwrights and joiners for R.A.F. carpenters, electrical artificers and torpedo ratings for R.A.F. fitters, marine attendants for R.A.F. batmen, and so on. The naval or marine ratings were to form part of the flight or other unit of the Fleet Air Arm, and to disembark with their units as required, but while embarked they were to be available for general ship duties, provided this did not interfere with their naval air duties. The settlement of this difficult problem, so far as it has gone, is welcome, and should prove one of the most important administrative acts performed during 1924 to advance the all-round effectiveness of the fleet.

## FLEET ORGANIZATION.

An interesting decision in regard to the classification of warships was communicated to the fleet on August 22, when it was announced that the use of the term "Light Cruiser Squadron" was to be discontinued, and these forces known in future as "Cruiser Squadrons." The latter term had been out of use since 1919, when, prior to the break-up of the Grand Fleet, the Courageous and Glorious formed the First Cruiser Squadron. With the reconstruction of these vessels as aircraft carriers, there are no ships left in the old class of "cruisers" in the Royal Navy, and in view of the growth of the so-called light cruisers a reclassification of these vessels is already overdue. Many of them would be more correctly described as cruisers.

There has been no alteration in the distribution of the squadrons on other foreign stations, but changes have been made during the year in the flagships in Africa, the East Indies, and New Zealand. On the Africa Station, the Lowestoft was relieved early in December, 1923, at Sierra Leone, by her sister-ship the Brimingham, from the Nore Reserve, and she herself returned home to pay off for large repairs. In the East Indies, the Southampton was relieved as flagship in July, at Colombo, by the Chatham, from New Zealand. The latter vessel, in accordance with the decision of the Dominion authorities to have an oil-burning cruiser, was relieved at Wellington on May 17, 1924, by the Dunedin, which had made the voyage out as a unit of the Special Service Squadron.

## Revising the King's Regulations.

In the realm of administration, an interesting event of the year was the appointment of a committee under Vice-Admiral Sir Hugh Tothill to revise the King's Regulations and Admiralty Instructions, and to consider the advisability of issuing in a separate manual instructions in regard to the duties of accountant officers. This was a work which was long overdue, especially in view of the great changes made during and since the war. Another event of the year was a revision of the official Navy List, concurrently with a change of printer. From the issue of April, 1924, the size of the pages was increased; the lists of retired officers, formerly published quarterly, were ordered to be issued separately in January and July; and the rates of pay, regulations for uniform, and the like, formerly printed at the end of each quarterly issue, became the "Appendix to the Navy List," issued separately in April and October, at the price of 1*s.* 6*d.* The lists of receipts of orders and decorations, which had grown so much during and since the war that they were only given in the April issue each year, are now published separately. In the Navy List itself, the most important change was the abolition of the ship numbers, both under the vessels' names and also in the alphabetical index to the active list. Instead of these numerals, the actual name of a ship or establishment, or an abbreviation of it, denotes where an officer is serving. The numerical plan had been a feature of the official Navy List ever since it was established in 1814.

## Naval Reserves.

The question of the future adequacy of the various reserves for the Royal Navy is an important one. In a speech on October 23, 1923, Admiral Sir Henry Oliver, then Second Sea Lord, said:

> We have now a Navy with a very reduced personnel of only two-thirds the pre-war strength. At present we have a very large Fleet Reserve, but in a few years it will dwindle away, as from now on a smaller number from the Navy will be passing into it annually. In future, the Royal Navy will have to look for expansion more than ever to the Royal Naval Reserve, which has always seconded it so nobly and efficiently in the past, and subsequently will have to draw on the Mercantile Marine, as in the last war. The Mercantile Marine cannot be drawn on indefinitely to supply the sea fighting forces with British professional seafaring men if the total supply is inadequate.

The present strength of the R.N.R., all branches, is about 1,520 officers and 7,797 men. In the last Navy Estimates, the total number of Fleet Reservists, class "A" (pensioners) was given as 8,388, as compared with 8,327 in 1914; and of class "B" (non-pensioners), 23,521, as compared with 18,710 in 1914. There is now, however, no Immediate Reserve, which then numbered 4,070. The aggregate total, including class "C" (non-pensioner artisans), is now 31,945, as compared with 31,137 in 1914. But just as the 1914 total was a growing one, having risen from 28,764 in the previous year, the 1924 total is a dwindling one, having fallen from 35,176 in 1923–24, and it is this falling off, which must inevitably continue as a sequel to the post-war reductions, which constitutes a serious factor in considering future naval strength and efficiency. Moreover, in addition to the smaller numbers of the active fleet of to-day, comparatively few of them are short service or non-continuous service men. The plan of Lord Fisher of entering each year a large quota of "sea labourers" who were only in the fleet for a five-year term and then passed into the Reserve while still young men, is not now in operation. It was this plan, in the ten years preceding the war, which gave us the personnel needed to man every effective ship on mobilization, and even a surplus for duty in the Royal Naval Division. Since the war ended, we have been living on our resources, which have been large, but are now shrinking below the pre-war limit.

In these circumstances, the importance of encouraging the Royal Naval Volunteer Reserve is manifest, and an interesting event of the past year is the creation, as from April 1, 1924, of an Ulster Division, to which the Marquess of Dufferin and Ava has been appointed as Commanding Officer, with Captain R. F. H. Hartland-Mahon, R.N., as Second-in-Command. Including the five sub-divisions in this new unit, the R.N.V.R. now consists of 55 sub-divisions, each of 100 men. The strongest division is that in Scotland, with 14 sub-divisions, London coming next with 10. An interesting table issued with Admiralty Fleet Orders on March 7, 1924, shows that the present establishment of 5,500 men in the R.N.V.R. includes 4,125 belonging to the seamen branches (of whom 1,637 are seamen gunners and 1,100 signalmen, the rest including wireless ratings, buglers, seamen torpedomen, submarine ratings, mining, and anti-submarine men); 687 are engine-room artificers; 110 motor mechanics; 413 are artisans; and 165 writers. Considerable additions have been made since the war to the facilities for drill, and several of the old drill ships have been replaced by new vessels. The list of these units is: Eaglet, Liverpool; Flying Fox, Bristol; Dahlia, Newport, Mon.; Helicon, Newcastle-on-Tyne; Satellite, North Shields; Irwell, Manchester; Claverhouse, Leith; Unicorn, Dundee; Carrick, Greenock; Caroline, Belfast; and President, Thames Embankment.

For the positions of petty officer instructor and signal instructor in the R.N.V.R. Divisions, volunteers are called for by the Admiralty from chief petty officers and petty officers of the seaman class, and chief yeomen and yeomen of signals. Candidates have to be of very good character, recommended by their commanding officers, and within twelve months of completing their time for pension. The appointments are made for three years. A change in the conditions of enrolment in the R.N.V.R. made in January, 1924, provided that men in receipt of a pension from the State, whether temporary or permanent, on account of disability or injury, were not to be accepted. Any man who becomes eligible for the award of a pension or allowance on account of disability or injury, will be discharged.

### The Royal Marines.

Beginning with the first vacancy occurring in 1924, it was decided to reduce the number of major-generals in the Royal Marines by one, in consequence of the reduction in numbers of the corps, which are now 9,869, as compared with 18,585 in 1914. The general list now, therefore, includes seven officers—one general, two lieutenant-generals, and four major-generals—whereas before the war there were two generals, two lieutenant-generals, and five major-generals in the R.M.L.I., and one general, one lieutenant-general, and one major-general in the R.M.A., a combined total of twelve.

The amalgamation of the R.M.A. and R.M.L.I., described in the last issue of the "Annual," was completed well before the end of 1923. No applications for the voluntary transfer of marines from Eastney and Forton to the Chatham and Plymouth Divisions were allowed to be forwarded after September, 1923; and on August 24, 1923, a special retirement scheme for the officers rendered surplus to requirements on account of the reorganization was issued, to run for six months. This scheme was similar in essentials to that for the Royal Navy and Royal Marines introduced in May, 1922, except that the latter did not include any colonels. In the 1923–24 scheme, colonels second commandant were given the rate of retired pay to which they would have been entitled under existing regulations, with an addition of £100 per annum, subject to a total maximum of £900 per annum. In the 1924–25 Estimates, provision was made for adapting Forton Barracks, formerly the home of the Portsmouth Division of the R.M.L.I., as a boys' training establishment. Probably in time this will take the place of the Impregnable at Devonport, since all experience shows that shore buildings such as those at Shotley are very much better for the health of boys under training than the cramped quarters on board old hulks in harbour.

While the last issue of the "Annual" was passing through the press, the appointments were announced of the first officers to hold the positions of Honorary Colonels-Commandant of the Royal Marine Divisions. The King was graciously pleased to sanction these appointments for general officers, to be vacated at seventy years of age. They carry no extra emoluments, but the holders are allowed officially to visit the Division to which they are appointed once a year, for which purpose Government railway passes are issuable. It was fitting that the first Honorary Colonel-Commandant of the Chatham Division should be General Sir William Adair, K.C.B., whose family have been associated with the Corps for several generations. His father, Sir Charles W. Adair, and grandfather, Thomas B. Adair, were both Generals in the Marines, while his great-uncle, Captain C. W. Adair, R.N., was killed in action on board the Victory at Trafalgar. The other two Honorary Colonels-Commandant, Sir Archibald Paris and Sir Charles Trotman, both served with distinction in Gallipoli and France during the war; and were both wounded.

Two minor concessions made since the last issue of the "Annual" may be placed on record. The maximum age on selection of candidates for Corps Commissions in the Royal Marines was fixed for 1924 at twenty-four years, and for 1925 at twenty-three years. This is still two years older than the corresponding age for candidates from the lower deck of the Royal Navy for the grade of Mate, but the conditions, of course, differ considerably. The other concession was the grant of an additional serge or tartar tunic to those ranks who are not supplied with khaki service dress clothing.

### TENURE OF FOREIGN SERVICE.

From January, 1924, the appointments of naval personnel on shore at Abadan, Aden, Bombay, Colombo, Singapore and Trincomalee were ordered to be normally of two years' duration, except where shorter periods were already laid down. This term compares with a normal length of commission for ships on foreign stations of two and a half years, which was adopted in February, 1922, instead of two years, in order to effect economy in the cost of carrying out foreign reliefs and to reduce the number of men duplicated by "crossing reliefs." The two and a half years are exclusive of the time spent by the crews on passage or awaiting suitable opportunity for passage, but the time away from home ports is not to exceed three years. These two and a half year terms apply to naval establishments abroad, in the same way as to ships, but exceptions, such as those indicated above, have been made in the case of those stations where for climatic reasons it is desirable to curtail the period of service.

Now that the Fleet is being employed more on foreign stations the personnel will have many more opportunities of seeing the world than at any time during the last twenty years, but so long as the manning and mobilization work is carried out as methodically as at present there will be no danger of a return to the old bad system, or lack of system, under which officers and men were isolated on foreign stations for many years at a stretch.

## II. THE DOMINION NAVIES.

### AUSTRALIA.

In reviewing the present position of the Dominion navies, the most encouraging sign is to be found in Australia. At a banquet in honour of the officers of the Special Service Squadron in March, 1924, Mr. Bruce, the Prime Minister, stated that Australia is prepared to create her own navy, completely autonomous in time of peace, but forming a unit of the Empire's Navy in time of war. As is well known, this was not so much a hopeful promise as a statement of fact, as Australia definitely created her own navy in 1911, and it played its part in the war. Since then, it has, in common with other naval forces of the Empire, been reduced owing to the need for economy, and whereas there were in commission in 1919 a total of twenty-five fighting units—a battle-cruiser, six light cruisers, twelve destroyers, and six submarines—now there are only five—the light cruisers Brisbane and Adelaide, the flotilla leader Anzac, and the destroyers Stalwart and Tasmania. This excludes, of course, auxiliary and depôt-ships and the sloops suitable for mine-sweeping or surveying. Two light cruisers and nine destroyers are in reserve with care-and-maintenance parties, or utilized for training in harbour; but there are no submarines, the six of the " J " type presented to Australia by the home Government in 1919 having been disposed of.

Hence, as in England, naval strength has been cut to the bone, and the question of the provision of new units to replace those which have disappeared has become urgent. In March, the Federal Government announced its decision to build two new cruisers of the present standard type of 10,000 tons, and three long-distance submarines at a cost of about £250,000 each. The Federal plans also include the provision of an oil fuel base at Port Darwin, an increase of the Air Force with a seaplane base at Sydney, and certain military measures. Following the British Government's postponement of the Singapore scheme, there was a more vigorous demand for a complete and self-contained system of defence for Australia than had been the case for some years. In April, the Minister of Defence, Mr. Bowden, announced that in addition to the two cruisers, which it was estimated would take three years to build, there would be a new cruiser every third year until the Navy had a squadron of four. In addition to the seaplane base at Sydney, there may be one at Albany or some other point in Western Australia.

The original intention was to order one cruiser in Great Britain and build the other at Cockatoo Island Dockyard, Sydney; but estimates prepared by the Government showed that a substantial saving in time and money would be gained if both vessels were ordered from British builders. On September 5, 1924, Mr. Bruce stated that the Federal Government had decided to invite tenders both from England and Australia, the English tenders being asked for (1) the construction of one cruiser to be built in British yards; (2) the construction of both cruisers in Great Britain; and (3) the construction of one in Great Britain and one in Australia. The Admiralty were to be asked to make the necessary plans and specification, to be available for the High Commissioner immediately. Meanwhile, a proposal was made to build locally an aircraft-carrier and a floating dock with the £1,000,000 or more which it was estimated would be saved by having the second cruiser built in Great Britain. The Commonwealth Naval Board was strongly in favour of both cruisers being British-built, on the ground that at least six months would be saved; but the Government had political and economic aspects to consider, including the question of unemployment.

An explanatory statement on the defence estimates presented to the Australian Parliament at the end of August showed that the five oil tanks of 8,000 tons capacity each, to be built during the next five years, might be regarded as an interim step until the British policy in regard to a Pacific base had been decided. The permanent naval personnel is being increased from 4,472 to 5,509, and the citizen Naval Reserve to 3,042. For purposes of training (the statement added) six destroyers were to be stationed at various ports, the first to be so employed being the Warrego, one of the pre-war vessels. She arrived in Brisbane River on August 11, 1924.

## NEW ZEALAND.

During the entertainment of the Special Service Squadron in New Zealand, an opportunity was taken by the Prime Minister, Mr. Massey, whose appreciation of the services of the fleet and the importance of sea power is well known, to make an interesting announcement on the Dominion's co-operation in naval defence. Speaking at the State luncheon in Wellington on April 28, he said that, if a contribution towards the Singapore scheme were not required from her, New Zealand would be willing to maintain a second cruiser. If, on the other hand, the scheme were proceeded with, New Zealand must contribute her full share. Either proposal would cost a quarter of a million sterling, and bring the total expenditure for New Zealand's defence to over a million; but this was not too much. Mr. Massey declared emphatically that New Zealand had not done enough as regards naval defence. Some practical advice was given on the same occasion by Vice-Admiral Sir Frederick Field, who said that the reduced main fleet would be unable to prevent raiders from escaping or to send assistance to every threatened point in the defence of trade or of the Dominion. Trade could not be protected unless more cruisers were provided for Dominion defence, and he advocated the provision by New Zealand of three as a measure of safety. After advising the people not to form too hasty a judgment of the Government's action in regard to Singapore, he said that much could be done for naval defence apart from a Singapore contribution, such as the building of harbour defences and the training of yachtsmen for mine-sweeping service. In an interview at Wellington on May 7, Vice-Admiral Field again urged the necessity of acquiring a second cruiser with the ultimate intention of maintaining three. In accordance with Admiralty recommendations, Sir Frederick, during his Wellington visit, selected a site for a 5,000-ton oil tank. As regards the New Zealand naval force generally, the outstanding event was the arrival from England of the Dunedin to relieve the Chatham as flagship, the former oil-burning vessel being more effective and suitable for the work. In 1923–24, New Zealand voted £338,699 for naval defence, exclusive of the contribution of £100,000 towards the cost of the Singapore base and loan charges in connection with H.M.S. New Zealand.

## CANADA.

No change whatever has taken place in the composition or organization of the Canadian Navy since the last "Annual" appeared. The total number of units on the list remains at eleven, including the light cruiser Aurora and two submarines paid off at Halifax, there being in commission four small craft at this base and four at Esquimalt. The amount provided for naval defence in the year 1923–24 was 1,515,500 dollars, as compared with £2,086,875 by Australia, £338,699 by New Zealand, and £71,949 by South Africa. Although some admirable speeches were made during the receptions given to the Special Service Squadron at Halifax and Esquimalt, the fact remains that Canada is lagging very much behind other Dominions in the actual steps taken to protect her own trade. In Canada, as elsewhere, some valuable missionary work was put in by Vice-Admiral Field and his officers, but whereas their speeches in Australia and New Zealand were followed by evidences of increased activity in regard to shipbuilding or other means of naval protection, no such result followed the Canadian visits. At Victoria, the Vice-Admiral reminded his audience that the protection of the Dominion's trade routes was essential to the preservation of its commercial prosperity; that with the British Fleet reduced as it is it would not always be possible to send ships to any point of the Empire that might be threatened; and that "if naval aid were needed, Canada would be unable to produce it speedily." Sir Frederick's remarks were not well received in certain quarters, and certain politicians objected to what they called his injudicious excursions into a domestic controversy, but the Admiral had a complete answer to such criticism. He categorically denied having made any special reference to Canada's naval policy. "I am not here," he said, "to dictate or to offer gratuitous advice. All I can do is to lay the plain facts as a sailor sees them. If I were a Canadian farmer depending for my living on overseas markets, or the head of a commercial concern, I think I would be anxious to see the trade routes adequately protected in time of war." A few weeks later, before the squadron left Quebec, Sir Frederick was able to express the opinion that there was a growing sentiment in Canada in favour of Canadian participation in naval defence, and that this sentiment would have a practical expression when Canada's overseas trade assumes larger proportions. This opinion, he said, was based on his conversations with leading Canadians all over the Dominion.

## SOUTH AFRICA.

The Union Government has made an excellent beginning with its own naval service, and good work has been done during the year with the surveying vessel Protea and the mine-sweeping trawlers Immortelle and Sonneblom, but it is to be hoped that South Africans will realize the desirability of their acquiring a cruiser of their own in the near future. Should the Suez Canal become blocked, greater importance would again attach to the Cape route. The personnel of the South African naval service was shown for the first time in the official Navy List for January, 1924. The Service is administered by the Department of Defence, the Minister of which is Colonel the Hon. H. Mentz, who is President of a Council of Defence, the members of which, however, all hold military ranks.

## THE EMPIRE CRUISE.

The world voyage by a powerful squadron of the British Navy has been accomplished under conditions never before achieved. The first authoritative announcement of such a cruise was made by Mr. Amery, then First Lord, at a sitting of the Imperial Conference on October 17, 1923, at which the proposal was cordially approved. Its object was twofold—first, to show the British flag throughout the Empire in a worthy manner; and secondly, to give certain vessels an opportunity for long-distance cruising, which they had not had for some years. But there were other advantages to be gained as well. It afforded valuable training and experience to officers and men. Its influence on recruiting, and particularly on the class of recruits, was all to the good. It came as a reminder to other countries of the skill and ingenuity of British shipbuilders and marine engineers. It served to encourage the oversea trader by a demonstration of the ubiquity of sea power, upon which he has to rely for the successful conduct of his business. It was also an object lesson to the Dominions of the need for ships to keep open the sea communications, bidding them reflect that what these cruisers could do, in appearing off their ports so swiftly and silently, those of other countries, with a less peaceful purpose, might accomplish at some future date unless checked by vessels of equal power.

The ships chosen for the cruise were those of the Battle-Cruiser Squadron and First Light Cruiser Squadron of the Atlantic fleet, commanded by Rear-Admiral Sir Frederick L. Field, K.C.B., C.M.G., and Rear-Admiral the Hon. Sir Hubert G. Brand, K.C.M.G., K.C.V.O., C.B., respectively. The former was granted acting rank as Vice-Admiral Commanding the Special Service Squadron, with effect from November 5, 1923, his flagship being the Hood. The battle-cruiser Repulse also took part. The light cruisers were the Delhi (flagship of Rear-Admiral Brand), Danae, Dauntless, Dragon, and Dunedin. The last-named ship did not leave Chatham until December 28, and joined up with the Special Service Squadron at Trincomalee. With this exception, the vessels rendezvoused off Plymouth on November 27, 1923, and proceeded to carry out the following programme :—

*Battle Cruisers.*—Left Devonport, November 27 ; Sierra Leone, December 8–13 ; Cape Town, December 22–January 3 ; Zanzibar, January 12–17 ; Trincomalee, January 27–31 ; Port Swettenham, February 5–9 ; Singapore, February 10–18 ; Fremantle, February 27–March 1 ; Albany, March 2–6 ; Adelaide, March 10–15 ; Melbourne, March 17–25 ; Hobart, March 27–April 3 ; Jervis Bay, April 5–8 ; Sydney, April 9–20 ; Wellington, April 24–May 8 ; Auckland, May 10–17 ; Fiji, May 21–27 ; Honolulu, June 5–12 ; Vancouver and Victoria, June 21–July 4 ; San Francisco, July 7–11 ; Panama, July 23 ; Colon, July 24 ; Jamaica, July 26–30 ; Halifax, August 5–15 ; Quebec, August 18–September 2 ; Nova Scotia or Newfoundland, September 4–17 ; Home Ports, September 28–29.

*Light Cruisers.*—Left Devonport, November 27 ; Sierra Leone, December 8–13 ; Cape Town, December 22–29 ; Durban, January 1–5 ; Mombasa, January 12–17 ; (Danae to Dar-es-Salaam, January 12–17) ; Trincomalee, January 27–31 ; Penang, February 4–8 ; Singapore, February 10–18 ; Fremantle, February 27–March 1 ; Albany, March 2–6 ; Adelaide, March 10–15 ; Melbourne, March 17–25 ; Hobart, March 27–April 3 ; Jervis Bay, April 5–8 ; Sydney, April 9–12 ; Brisbane, April 14–22 ; Sydney, April 24–26 ; Lyttleton, May 1–8 ; (Dauntless to visit Campbeltown Bluff and Dunedin to visit Dunedin) ; Auckland, May 10–17 ; Fiji, May 21–27 ;

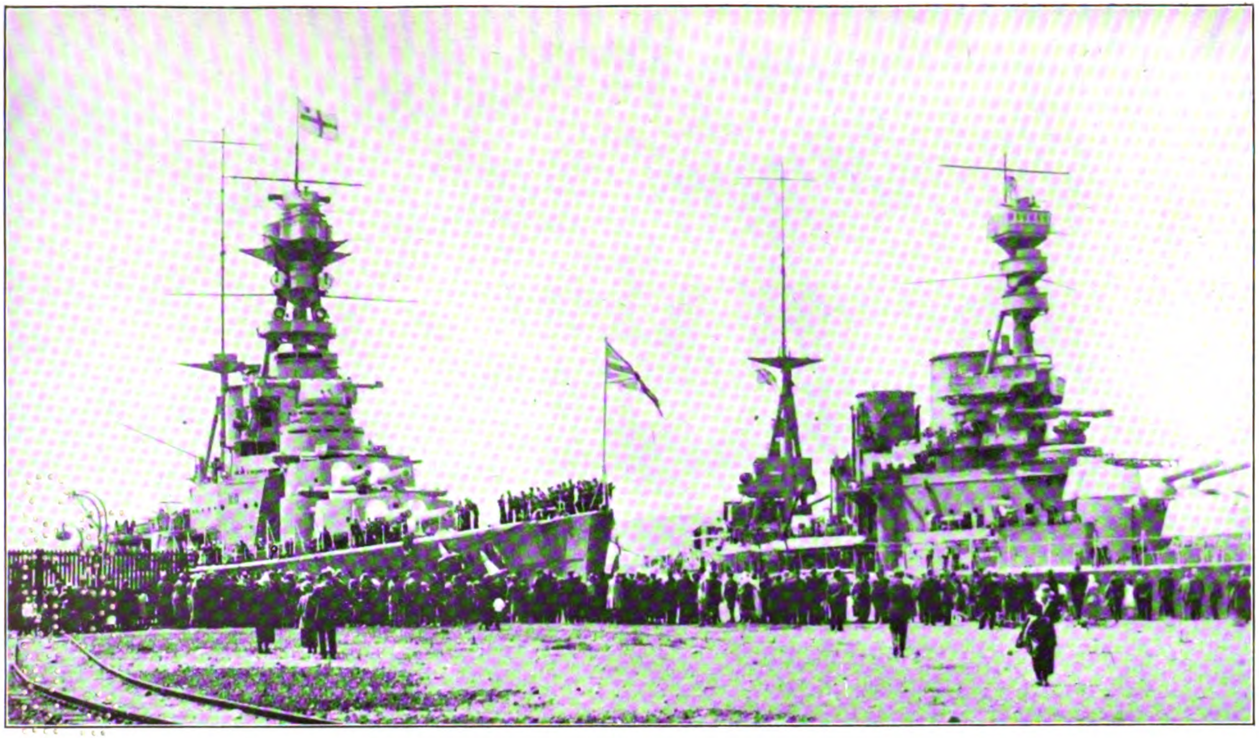
**Honolulu, June 5–12; Esquimalt, June 21–July 4; San Francisco, July 7–11; Callao, July 26–August 2; (Delhi, Danae) Valparaiso, August 7–12; (Dauntless, Dragon) Talcahuano, August 8–13; Punta Arenas, August 17–18; (Dauntless) Falkland Islands; (Dragon) Bahia Blanca, August 21–26; (Delhi, Danae) Buenos Aires, August 23–28; (Dauntless) Montevideo, August 23–28; Rio de Janeiro, September 1–8; Cape Verde, September 18–20; Home Ports, September 28–29.**

Except for slight alterations, owing to circumstances which could not be foreseen, this programme was carried out punctually and without serious hitch of any kind, a marvellous tribute to naval efficiency. The programme in Australia was modified to allow the light cruisers to return to Sydney for Anzac Day. At this port also the Australian light cruiser Adelaide joined the flag of Vice-Admiral Field to return to England with the battle-cruisers, remaining a month, and then proceeding to Australia via the Suez Canal. This interchange of vessels was very useful from the standpoint of Imperial naval co-operation and the co-ordination of the training of officers and men of the Commonwealth with that of the Royal Navy. At Auckland, on May 17, the light cruiser Dunedin was transferred to the New Zealand Government for service in place of the Chatham, which, however, did not join the Special Service Squadron, but proceeded to the East Indies as flagship in place of the Southampton, which was ordered home.

While it is beyond the scope of this chapter to make a complete record of this remarkable cruise, which is creating a literature of its own, it should be observed that the welcome which the ships received at each port of call was extremely cordial. Sierra Leone led the way by a full programme of hospitality for the five days during which the ships were anchored there. At Capetown the squadron arrived in unprecedented weather; a storm was raging, accompanied by lightning and thunder, and a mist hid the vessels from sight of the shore, but crowds had assembled in the hope of seeing them. *The Times* correspondent at Capetown, writing on the success of the visit, remarked that the personality of the officers commanding such a squadron was highly important, and the present admirals were ideal in this way. As for the men, they behaved superbly, and the local police chief expressed his astonishment in this respect, since although the ships were at Capetown for Christmas and the New Year, and the men were ashore in thousands, there was not a single case of misbehaviour. Australia, New Zealand, and Canada in turn all gave the squadron a good reception. It was significant that not until June 6, or over six months after they left home, did the ships anchor in a foreign port, at Honolulu. The success of the tour might well lead to its repetition in the not far distant future, or at least to similar cruises within the Empire.

## THE SINGAPORE BASE.

In introducing the Navy Estimates in the House of Commons on March 18, 1924, Mr. C. G. Ammon, Parliamentary Secretary, announced that, after full consideration of all the relevant facts and consultation with the Dominions oversea, the Government had decided not to proceed further with the Singapore scheme. A



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WARSHIPS OF THE EMPIRE SPECIAL-SERVICE SQUADRON ARRIVING AT VICTORIA, B.C., ON JUNE 21, 1924.

speech was made on the same day by the Prime Minister. He showed that the argument that the Singapore scheme was contrary to any agreement come to at Washington was not sound. On the strategical aspect, too, " if we were driven to create a great fleet in the Pacific," said Mr. MacDonald, " then the strategical position of Singapore is second to none in the whole vast area of those waters." But the Government viewed the matter in a wider relationship, and decided that to proceed with the base " would exercise a most detrimental effect on our general foreign policy." This policy is one of international co-operation through a strengthened and enlarged League of Nations, the settlement of disputes by conciliation and judicial arbitration, and the creation of conditions which will make a comprehensive agreement on limitation of armaments possible. A statement was published giving the views of the Dominions. Canada refrained from any advice, but Australia, New Zealand, and Newfoundland urged that the base be proceeded with, New Zealand offering a first contribution of £100,000 towards it. From South Africa, General Smuts approved the action taken, and welcomed the abandonment of the scheme. The whole question was reviewed at length in the last issue of the " Annual," and it only remains to record here that in June there was offered for sale all the plant at the base which would deteriorate by keeping. A body of ten civilian officers and three workmen were retained temporarily to prevent the site, which had been partially cleared, becoming a breeding ground for mosquitoes and a malaria centre.

## THE YEAR'S WORK.

The work of the fleet at sea during 1924 opened inauspiciously with the loss of a submarine L.24, being sunk off Portland on January 10 after colliding with the battleship Resolution. Lieutenant-Commander Paul L. Eddis, four other commissioned officers, one warrant officer, and thirty-five ratings lost their lives. The submarine belonged to the flotilla attached to the School at Portsmouth, and had gone to sea with other vessels of her flotilla some hours ahead of the Atlantic Fleet, which was leaving Portland that day for its spring cruise to the Mediterranean, in order to make an attack upon the fleet as it debouched into the open waters of the Channel. L.24 successfully penetrated the destroyer screen, but rose to the surface almost under the bows of the Resolution, which rammed the submarine and she sank in a few seconds. The wreck was located about ten miles south of the Bill, and a memorial service held over the spot.

A good deal of cruising to foreign parts was performed by the squadrons and flotillas, much on the lines of the years immediately preceding. In addition, during June, over forty coast towns and seaside resorts at home were visited by sections of the Atlantic Fleet, and from July 7 to 13 the Fifth Destroyer Flotilla visited the Thames and anchored off Gravesend and Greenhithe. During June also, the Second Cruiser Squadron cruised in the Baltic. Set free from its duties in the Ægean and the Marmora, the Mediterranean

Fleet has been able, for the first time since the armistice in any force, to visit the western part of its station, and in September visited the principal ports of Spain, afterwards going to Gibraltar to join the reinforcements which had been transferred from the Atlantic Fleet.

As usual, there have not been lacking during the year occasions when the value to the Empire of the maintenance of its naval forces in an efficient and ready condition has been demonstrated under so-called conditions of peace. Early in the year, the revolutionary outbreak in Mexico made it necessary to send a cruiser there for the protection of British interests. In China, the very disturbed conditions have made increasing demands upon the gunboats maintained in the Yangtse River, and two motor launches have been sent out from England to reinforce them. In September, Rear-Admiral Murray Anderson, Senior Naval Officer on the Yangtse, landed in command of an Allied force of about 1,100 British, American, Japanese, and Italian seamen for the protection of the foreign settlement in Shanghai from a possible influx of defeated soldiers. Thus whether on the high seas or on the outskirts of a Chinese city, the Navy never fails in its duty to King and Empire. The great need of the moment is that the British peoples everywhere shall not fail in their duty to the Navy.

CHAS. N. ROBINSON.

# CHAPTER II.

## FOREIGN NAVIES.

THE points of interest in the activities of foreign navies have changed during the year under review. For two years attention was concentrated upon the results of the Washington Conference. The lists of ships to be destroyed by the signatories, the comparative tables of naval strength, the progress of ratifications, and the practical workings of the compact, engaged the undivided attention of naval experts and publicists. At the beginning of 1924, it was clear that the centre of interest was moving elsewhere. Foreign navies had, by then, practically assumed their post conference shape, and new questions began slowly to emerge from the new order. What naval policies would the Governments of the Great Powers pursue? To what systems of training would they subject their squadrons? And, what was more important, would those systems be of interest to technicians only, or would they be a guide to the ambitions and policies of the Great Powers? The change has not made the task of naval publicists easier. During 1922 and 1923, the matter with which they had to deal was issued in blue books, parliamentary papers, and diplomatic documents to which the widest publicity was given. Naval policies and fleet exercises are not discussed so openly as the Washington Conference; and such facts as are divulged are generally so carefully selected that it is often difficult to grasp their true significance. This reticence on naval matters is more marked in some Governments than in others; and it can be said that during the past year the American and French Admiralties have been the most inclined to give publicity to what their fleets were doing.

## UNITED STATES.

The points of real interest in the American navy's activities have been much hidden by a quarrel between the two great parliamentary parties, which centred round the granting of certain oil concessions in Hawaii, and by a disaster which occurred to a group of American destroyers, when operating off the coast of California. The second event calls for nothing but an expression of sympathy for the relations of those who lost their lives; and of admiration for the courage and endurance shown by the survivors. The first can be dealt with equally quickly. The issue raised was a matter for lawyers, and not for naval officers. Serious charges were levelled at the naval administration by its opponents: it was alleged that concessions had been granted illegally and corruptly ; and though no charge was levelled against him, Mr. Denby, the Secretary to the Navy, laid his resignation before the President. It was accepted, and he was succeeded by Curtis Dwight Wilbur, a gentleman who had served for a few years in the navy as a young man, and had then become a barrister and had risen to a high position in the Californian courts of justice.

Mr. Denby was much regretted by the officers of the navy: he had been associated with the great naval manœuvres which took place at the beginning of the year ; he had urged that money should be voted for the eight new cruisers which the Naval Staff consider essential if the position of the United States is to be maintained (see the " Annual " for 1924, pp. 45 *et seq.*) ; he had advocated that certain battleships should be brought up to date by increasing the range of their guns ; he had courageously used language in his annual report which admitted a state of naval rivalry between Great Britain and America, when others were engaged in denying that any existed ; and he had been a stout friend to naval officers in an administrative struggle about the method of taxing their salaries.

The acts with which Mr. Denby was connected, not the circumstances of his resignation, are therefore the points of interest in a review of the American navy, and they may be taken in order.

## PROVISION FOR NEW CONSTRUCTION.

The estimates for the year, amounting to roughly £70,000,000, were presented to Congress, and passed after a certain amount of negotiation between the Director of the Budget and the Navy Department. They contained no points of interest, and merely provided for maintaining the navy in its existing condition. Allowance was made for a slight increase in the personnel ; but that was all. The important question is to be sought elsewhere. Congress is now asked to provide money on a very large scale (1) for building eight light cruisers of the 10,000 ton class ; (2) for building and perfecting naval bases on both coasts ; and (3) for increasing the range of the guns in a number of the fleet battleships and for converting the boilers from coal to oil burners. These three projects have been treated separately and the present position is roughly as follows. The new building programme has met with no real opposition. The Naval Staff have urged that, though no limit was placed upon cruisers in the Washington Conference, the equality between the American and British fleets, which was at the basis of the whole compact, will never be reached without an expansion of cruiser strength. As might be expected the measure was well reported on by the Naval Appropriations Committee, and there is no reason to doubt that it will, in the end, be adopted. The only obstacle is the President's statement, at the time when the estimates were presented, that no additional charges would be admitted during the year. The effect of this will probably be that the contracts for the new cruisers will not be issued until late in the year 1925.

The base building programme is more complicated. With the expansion of the navy, the American Government was faced with the problem of housing it adequately, and several expert reports were drawn up before a definite scheme finally emerged. Cautiously, but firmly, the naval advisers showed that a programme of fleet bases was inseparably connected with questions of high policy: what were the political objects which the fleet was designed to meet, and how were they to be effected? The question of probable opponents, though not stated in exact terms, was therefore the root and essence of the whole problem. The solution finally adopted was to provide the United States with fleet bases on a scale which would enable her to concentrate every available ship either in the Atlantic or the Pacific. In the Atlantic main fleet bases, "capable of supplying the fleet in every respect," were to be either set up, or completed, at New York and in the Chesapeake Bay; supplementary bases for cruisers, destroyers and patrol craft were to be set up at Charleston, Key West, and Guantanamo Bay; ports in the Panama Canal were to be completed as advance depôts. In the Pacific, Puget Sound, San Francisco Bay and Hawaii were to be first class fleet bases; and a supplementary station was to be established at San Diego Bay. This gigantic scheme of naval development was to be spread over a period of twenty years, and would cost thirty-six million pounds.

### Development of Bases.

It seems unlikely that the project will be considered and approved as a whole, at all events for a considerable time; but certain of its items have been discussed. The experts urged that the expanded navy yard at San Francisco Bay should be set up at Alameda, and that the existing dockyard at Mare Island should be reduced so as to enable it to repair cruisers and light craft, but no more; their reason being that the existing base at Mare Island can only be reached by a narrow dredged channel, that the water alongside the dockyard wharves is so foul that it chokes a ship's condensers after a few hours, that the berthing accommodation is cramped and not capable of being expanded, and that the railway communications are of less capacity than those of Alameda. The proposal provoked a discussion which brought certain questions connected with harbour defence into strong relief. San Francisco Bay opens up into two arms of water behind the Golden Gates; and Mare Island lies well back in the northern of these two natural basins: Alameda stands opposite the point of land which constitutes the southern bastion of the entrance channel. Opponents of the plan argued that if Alameda were made the first repair and provisioning depôt of the fleet in San Francisco Bay, then, the navy would be putting its essential supplies at the mercy of a bombardment from the sea; that the latest Japanese battle-cruisers could easily fire their shells over the land which covers Alameda; that Japanese war plans had always opened with a sudden, violent stroke from the sea; and that, if the experts' plan were put into effect, the Japanese navy would have it in its power to dislocate American naval mobilization at a vital point, and at a critical moment.

The discussion before the Naval Appropriations Committee was more restricted; but in the end the naval plan was rejected. The defensive facilities of Mare Island and Alameda do not appear to have been considered; and the Committee seems to have been convinced that what was needed was not that the dockyard should be transferred from Mare Island to Alameda, but that the approach channel from the Golden Gates to the old yard should be widened and deepened. One of the naval experts who came before the committee admitted, under severe cross-examination, that, if this could be done, the navy would have all that was wanted. From all this it can be seen that the American project for building, extending, and completing naval bases on both her coasts is as yet in its preparatory stages. It is not yet known to what degree existing facilities on the Atlantic are to be expanded.

## THE WINTER MANŒUVRES.

Early in January the American fleet was divided into two groups called "Blue" and "Black" for the purpose of the forthcoming exercises; and the strength of the two forces was as follows:

| BLACK. | BLUE. |
|---|---|
| 5 battleships | 9 battleships |
| 31 destroyers | 30 destroyers |
| 1 aircraft carrier | 2 aircraft tenders |
| 1 aircraft tender with 15 sea-planes and 16 torpedo planes | 11 submarines |
| | 27 auxiliaries |
| 9 submarines | |
| 15 auxiliaries (minesweepers, etc.) | |
| A landing force of some 2,500 men | |

The inferiority of the Black forces was local only. It had been assumed that, during their advance from the eastern Atlantic, they had divided, that one group had made for the south-eastern harbours of the United States to contain the American forces in Charleston and Key West; and that the remainder had gone on to attack the Canal defences. It was further assumed, that, during the diplomatic tension which had preceded hostilities, the American fleet had been kept in the Pacific, so that, when war began, the Black fleet had made the first move. The main object of the exercises was, therefore, to see how far the American fleet could keep the Canal open in the teeth of an attack which had already matured.

Early in the morning of January 16, when the manœuvres began, the Blue fleet was just entering the Canal from the Pacific side, and the enemy was just opening its attack against the defences of the Atlantic entrance. During the night, protective minefields were laid out, and a considerable landing force was put ashore near Fort Randolph, which was carried during the early hours of the morning, after which the force pressed on to the air base at Coco Solo. No landing was attempted on the other side of the entrance, so that the Chagres batteries and Fort Sherman remained in Blue hands throughout the manœuvres.* The Black forces now closed in and

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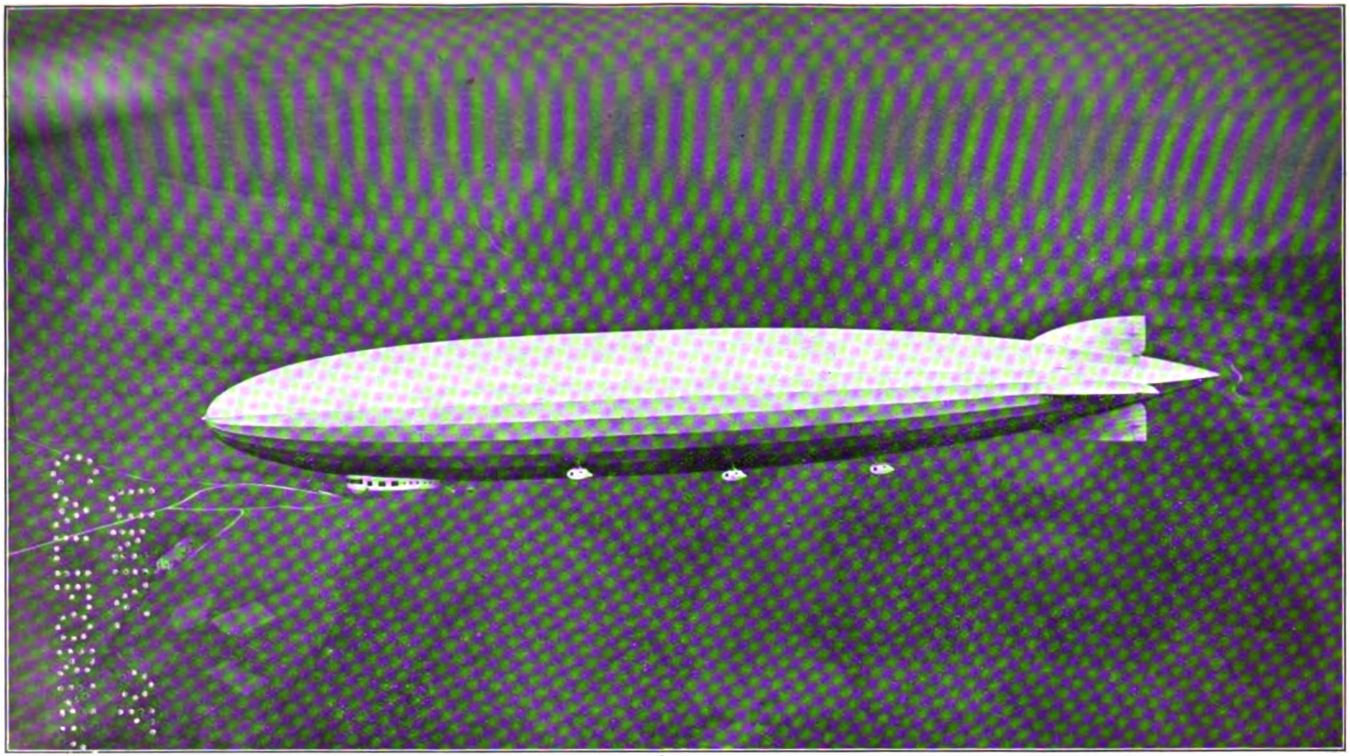
* The reason for this was that the landing forces would have suffered severely from malaria. In actual war the attempt would have had to be made.



(*Photo: Topical Press Agency.*)

ZEPPELIN AIRSHIP Z.R.3, CONSTRUCTED IN GERMANY FOR THE UNITED STATES NAVY.

The Z.R.3 flew from Friedrichshafen to Lakehurst, N.J., a distance of about 5000 miles, in 80¾ hours, arriving on October 15, 1924.

opened a bombardment of the Gatun Locks, which was continued throughout the day. During the afternoon, however, the Blue forces stationed on the Canal defences had concentrated for a counter-attack; and, by the evening, the umpires judged that the Black landing force would practically have been destroyed and Fort Randolph recaptured.

Meanwhile the Blue fleet was beginning to arrive; fifty-six vessels were passed through the Canal during the day; but by the morning, only five battleships, out of a total of nine, were present, and at about ten o'clock the Black forces stood in and opened a bombardment upon the ships in the harbour, having previously obstructed the channel by sinking a transport near the mouth. Simultaneously with the bombardment by the Black naval forces, aircraft attacked the Blue ships which were still passing through the canal. It was decided that they had not impeded the concentration, and by about noon the Blue fleet left harbour in full force, and the Black forces were withdrawn. This concluded the first part of the manœuvres.

### Attack on the West Indian Islands.

The object of the second set of exercises seems to have been to test the fleets capacity to carry out an amphibious attack on the West Indian Islands. The scouting fleet, accompanied by the aircraft carrier Langley and an expeditionary force, were ordered to seize the island of Culebra, to the east of Porto Rico; but neither the defending naval forces, nor the garrison of the island have been described. They seem to have included a considerable number of troops with a strong air force attached to them. The attacking force advanced from the southward and were located off the Danish island of Sainte Croix during their approach. A few hours later, an advanced force was put ashore on Viequez Island, and the scouting fleet retired to the open sea immediately afterwards. The defending forces, which seem to have been extremely weak, were bombarded at their anchorage in Target Bay as the scouting fleet withdrew.

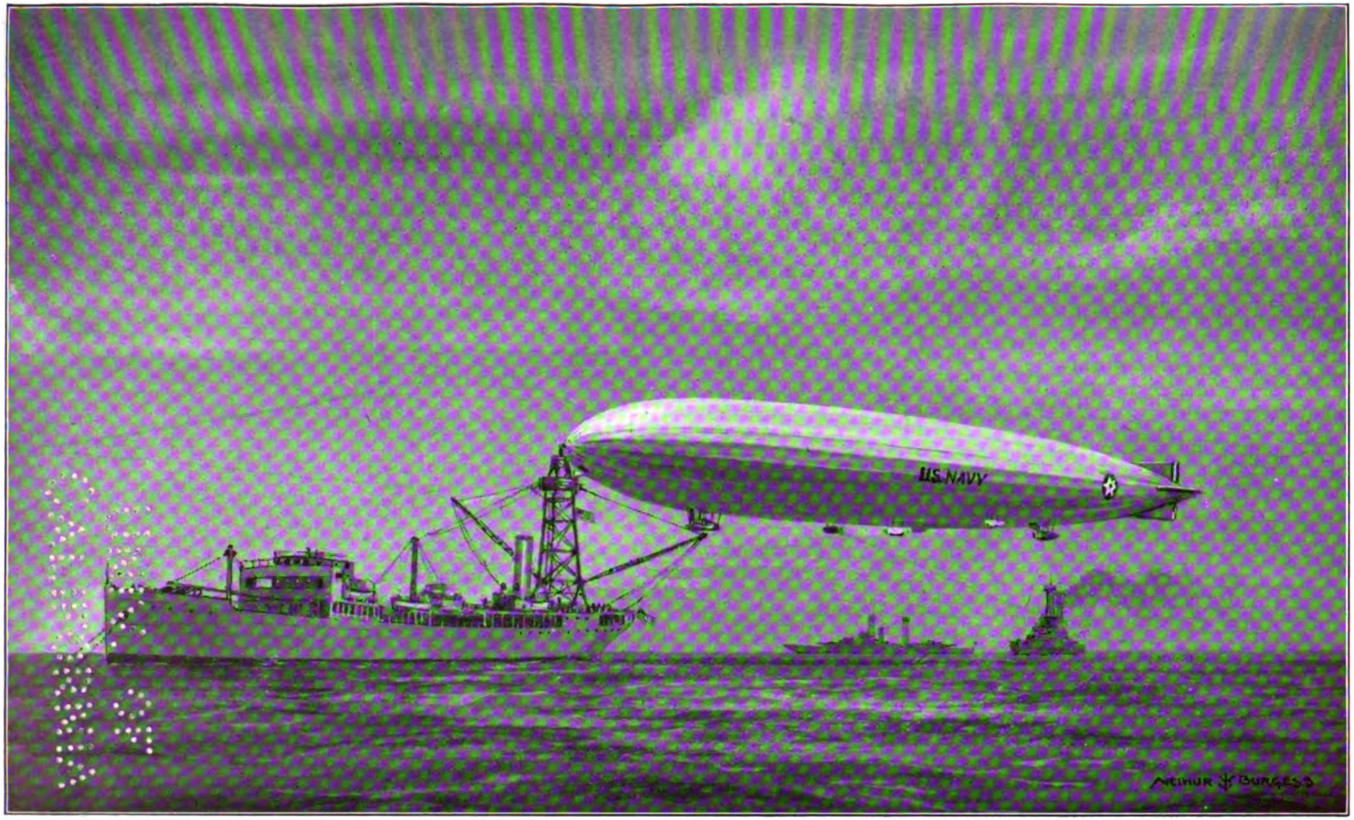
The following afternoon was spent in a diversionary attack upon the military positions at Culebra by the battleships and the air force. No landing was attempted, and towards dusk the force retired. At midnight, however, the ships which had carried out the attack during the afternoon, accompanied by the transport Henderson, approached the island and a landing force was successfully put ashore at Culebra Beach.

The results of these exercises created a certain amount of stir. The naval experts reported that the operations off the Canal had proved that the defences were too weak to resist a serious attack, that the garrison ought to be increased from 9,000 to 12,000 men, and that the lateral communications between the Atlantic and the Pacific entrances would have to be drastically improved. Out of this clamour there soon rose another. During the manœuvres two battleships broke down with engine-room trouble. The incident was taken to prove that the modernizing of the battleships and their conversion from coal to oil burners was an urgent necessity, until finally, as the discussion became more and more general, wide sections of the Press began to argue that the equality between the British and American navies—the basis of the Washington compact as was suggested, though the ratio applies only to battleships and aircraft carriers—existed only in name, and that the relative strength of the three chief co-signatories had been altered by the decline in American naval power. The uproar in the Press was so insistent that the Government had to take notice of it, and the naval authorities made some serious admissions. The Assistant Secretary to the Navy, Mr. Roosevelt, though he protested against the exaggerations in the Press, did not deny that the American navy was not equal in strength to the British. This statement was followed by another from the new Secretary, who confessed that naval material and equipment was not up to standard. Then came the official report upon the result of the manœuvres from Admiral Coontz. It was long and very depressing. Great insistence was laid upon the navy's demands for eight new cruisers, and for the improvements to the battleships, and it was roundly stated that not a single American capital ship possessed the combatant strength of British vessels of the same tonnage. The submarines came in for special condemnation.

## THE IMPROVEMENTS TO THE BATTLESHIPS.

The effect of these disclosures upon Congress was instantaneous, and the bill for the eight new cruisers was only held up at the last minute by a mere hazard in American parliamentary procedure. The funds necessary for converting the coal-burning battleships to oil burners were voted; but on one point the American parliament has remained cautious. No money has been given for increasing the range of the battleships' guns; but it cannot be supposed for a moment that the project is dead, and, if revived, it will raise a definite issue between the signatories to the Washington agreement. Are the proposed alterations allowable under the terms of the treaty? The American Government has committed itself to the statement that the alterations can be made without any breach of the agreement; but the contention does not meet legitimate objections.

The treaty definitely lays down, that no alterations in the side armour, calibre, number or *general type of mounting of main armament* shall be permitted except in certain specified cases. It is quite impossible to see how a battleship's guns can be increased in range and elevation without altering their type of mounting, so that the British Government can only maintain that the proposed alterations are illegal. This, however, does not exhaust the objections. In Chapter 2, part 1 of the treaty, the capital ships which the Powers are to retain are laid down in a list which specifies every ship by name. These lists are the basis upon which the equality of strength between the two Powers has been estimated, and it is perfectly clear that they were drawn up with due regard to the fighting strength of every vessel named. If, therefore, the combative power of any one of them is altered, the whole basis of the calculation is altered as



(*From a drawing by Arthur J. W. Burgess.*)

UNITED STATES NAVAL AIRSHIP SHENANDOAH, SECURED TO THE MOORING MAST OF THE AIRSHIP-TENDER PATOKA.

UNIV. OF CALIFORNIA

well. Objections based on the letter and on the spirit of the treaty thus lead to the same conclusions.

## SEA POWER AND AIR POWER.

Whilst the discussion upon the alleged decline of American naval power has engaged the Press and Congress, another problem has obviously been seriously in debate amongst American naval experts : the tactical co-operation between the navy and the air force. For the past two years the American navy has been paying great attention to the effect of attacks from the air upon capital ships. Bombing experiments were carried out against two old German battleships ; and the results were considered to be so significant that new experiments were arranged for in September, 1923.

The two old battleships New Jersey and Virginia, which were due for scrapping, were anchored off Cape Hatteras. At first the bombing machines were stationed at Langley field (150 miles distant) ; later in the day, however, the aeroplanes attacked from a temporary station which was much nearer at hand.

The first attack was directed against the New Jersey with 600 lb. bombs, from a height of 10,000 ft., one direct hit was obtained and two bombs fell fairly close ; the second attack was carried out by eight planes, working at an altitude of 6,000 ft., and carrying 2,000 lb. bombs. This time no hits were obtained though some explosions took place very near the ship and were supposed to have opened up the rivets, as the New Jersey was seen to take a list soon after. The aeroplanes now turned their attention to the Virginia. Seven planes carrying 1,100 lb. bombs attacked her from a height of about 3,000 ft. ; of the fourteen bombs dropped only one, the fifth, was a direct hit; but it obviously did enormous damage, as the mast, funnels, and most of the upper works were seen to have been carried away when the smoke and gases of the explosion had cleared. The remaining thirteen fell fairly close, and may possibly have assisted in sinking the ship, which turned over and sank a few minutes after the last aeroplane had dropped her bombs. The New Jersey was more resisting : a fresh attack delivered by three planes from 3,000 ft. with 2,000 lb. bombs, failed to score any hits, and the vessel remained afloat ; but on the fifth, and final attack, a 2,000 lb. bomb struck the ship near the foremast, and she sank six minutes later.

## STATIONARY TARGETS UNDER AIR ATTACK.

The conclusions drawn from these tests have not, of course, been divulged ; but there arose out of them a discussion in which Lieutenant-Commander Grow, an officer on the active list of the navy, took a foremost position. As his views may be taken to be fairly representative of expert naval opinion, they may as well be set out in full. In his first article upon the bombing tests Lieutenant-Commander Grow merely described the results obtained and compared them with what might have been done in actual war conditions : " In every attack the bombing planes flew in a loose, ragged column, approximately half a mile apart. This method of attack could not, of course, be employed against any objective defended by fighting planes. Neither can an attacking force circle an objective for three-quarters of an hour, choosing the wind, and the most favourable conditions, before dropping their bombs, even though local control of the air has been obtained." None the less the writer maintained that, had the attack been made in regular battle formation, an equal number of hits would have been obtained. It was of great importance that the targets were stationary; "for, even though aeroplanes are now fitted with sights which adjust the aiming apparatus to the target's course and speed, it will always be very difficult to hit a moving enemy, who is zig-zagging to throw out the range, except by salvo bombing." From the results obtained Commander Grow concluded that a hit from a 2,000 lb. bomb would probably put any capital ship afloat out of action, and that "should an enemy gain control of the air at sea, victory is absolutely certain."

After this article had appeared, the discussion was taken up by the American Director of Naval Intelligence in more general terms. In a paper read at Washington, he faced certain critics who had drawn very far-reaching conclusions from the bombing experiments in uncompromising language. "I have been in the navy thirty-five years, and I have seen the battleship put out of business, on paper, many times. First there was the ram . . . then the Zeppelin . . . and now the aeroplane bomber. . . . Every form of attack has developed a corresponding defence, . . . and history shows that new forms of warfare may add to, but never abolish older forms. . . . Aviation is an additional means of making war; it is a powerful auxiliary; but after all, only an auxiliary. It must be supported and operate from bases. If its base is at sea, on air craft carriers, there must be fleets to guard the carriers. . . . The aviator never holds anything, he is essentially a raider. . . ." This utterance by an officer of recognized ability was important in that it showed that the American high command has made up its mind upon the current controversy, and is much more decided than contemporary opinion on the European continent. During the next few years we may reasonably expect the naval programmes of certain European Governments to fluctuate in sympathy with the uncertainty of their experts upon the future conduct of naval war. America has made its decision and is not likely to change it: her naval programmes will simply be a steady progress along the lines adopted.

## PROBLEMS OF TACTICAL CO-OPERATION.

Some time after publishing his first article upon the results of the bombing tests, Lieutenant-Commander Grow attacked the subject of tactical co-operation between the air force and surface ships. Though careful to conceal the data from which he drew his conclusions, certain passages in his new essay suggested that the whole article must be based upon the fleet practices which had taken place in the Caribbean earlier in the year. How far the writer's views are shared by the American high command is, of course, unknown: as they are the only official utterance upon an extremely important subject, they are worth repeating.

The fleet is divided into three principal sub-divisions: the battle fleet, the scouting fleet, and the fleet base force; and the first step in solving the problem of aero-naval co-operation is to decide what are to be the distinctive duties of the air arm attached to each of these sub-divisions. It is obvious that the air force will be working with the fleet, first when it is concentrating at a base, such as Hawaii, either during a period of diplomatic tension, or just after war has begun; secondly, when it is cruising at sea, intact; thirdly, when it has gained contact with its opponent, but before a fleet engagement; and, finally, during a major engagement.

Taking each of these phases in turn, the officer decided that "when the fleet is concentrated at a base, during war, the duty of defending it from the air belongs to the naval district command" and not to the air force attached to the fleet, "as it is of primary importance that every plane and every pilot" of the fleet air arm should be ready for service at any moment, and no duty should be interposed which could possibly keep it back.

### "The Primary Use of Aircraft."

When cruising at sea "the primary use of aircraft is scouting either in separate scouting force, or as adjuncts to light cruisers, submarines or other craft." Lieutenant-Commander Grow urged that the aeroplane carriers should be stationed with the main body, behind its protective screen. Even if the enemy is relatively weak in aircraft, he will always be able to use his aeroplanes for preliminary scouting. Any attempt to interfere with his aerial reconnaissance by stationing the air carriers in an advanced position with the scouting forces will probably result in the fighting planes being absent from the main action. The thing to ensure is an absolute control of the air just before the main engagement begins, so that the stronger force may enjoy the advantage of aerial spotting and deny it to the enemy. "It is for this reason that I advocate retaining the large carriers with the main body, and using with the scouts and screen only such aircraft as may be on vessels in these units."

Aerial scouting will probably make it certain that each fleet will be aware of the other's approach from a distance of forty miles. "As the main bodies come closer, the screens will clash, and the use of aircraft will increase. It is at this point that aircraft should make a decided effort to penetrate as near to the enemy main body as possible, and the struggle for control of the air will doubtless commence at this time." After the main action begins, fleet aircraft will be called upon to (1) destroy enemy observation planes; (2) carry out tactical scouting; (3) spot the fall of shot; (4) protect the spotters; (5) carry out bombing and torpedo attacks on the enemy's fleet and carriers; (6) carry out gas attacks on the enemy's line of approach; and (7) attack disabled or partially disabled ships. Lieutenant-Commander Grow admitted that he could not discuss how these various duties would be carried out without making use of some of the confidential information upon which his article had apparently been written. He suggested, though very guardedly, that the solution most likely to be adopted will be that of dividing the fleet arm into an offensive and a defensive section. By refusing to discuss, or to describe, positive cases of tactical co-operation, the writer did not greatly add to our knowledge of the subject; but his articles are, none the less, highly important in that, if read in conjunction with the utterances of the American Director of Naval Intelligence, they leave no doubt as to the American policy with regard to the fleet air arm. Its auxiliary character is treated as an axiom, outside the scope of discussion or debate. On this highly important matter, therefore, American and British practice is likely to differ: nothing suggests that the American naval and military experts consider the creation of a separate air force as desirable in the very slightest degree.*

## JAPAN.

When the last number of the "Naval Annual" was sent to press only the barest details of the great earthquake were known. The disaster and its consequences have completely dominated Japanese naval activities during the year; no manœuvres have taken place; the money which would have been spent upon them has been devoted to relief work; and the fleet has simply carried out its ordinary routine exercises in home waters. The naval damage is now known: it extends to Yokosuka, Yokohama, Tokyo, Uraga, and Hiratsuka, which may be taken in order. The total loss, excluding that of the private shipyards, amounts to about £10,000,000.

*Yokosuka.* Practically every naval establishment was either burnt down or destroyed by the earthquake; the Engineering College, Naval Depôt, Naval Hospital and Naval Victualling Yards were completely destroyed, the commander-in-chief's office, the gunnery school, and torpedo school being half demolished. In the naval dockyard several slips and repair basins were severely damaged, and the Amagi, a battle-cruiser in process of conversion into an aircraft carrier, was so damaged that she was subsequently relegated for scrapping; about eighty thousand tons of oil fuel was burnt, and submarines numbers 10 and 14 (450 and 480 tons respectively) were severely damaged.

*Yokohama.* The damage to the private dockyard was very general; piers, slips, basins, machine sheds and cranes were destroyed, and the light cruiser Naka (5,595 tons), in the process of construction there, was practically destroyed.

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* After the foregoing article was written news was received about an accident in number two turret of the U.S. battleship Mississippi during firing practice. There were two separate occurrences: first, the charge of the right gun ignited before the breech was closed, as a result of which three officers and forty-five men were killed and nine men injured; secondly, the left gun of the same turret was accidentally discharged, and ten more men were injured. A court of enquiry decided that both accidents were due to the fact that there was insufficient air pressure, and that the guns were not properly cleared of gas before loading.

*Tokyo.* All the naval establishments, with the exception of the Admiralty, were completely demolished. The Ishikawajima private shipyard was severely damaged, as also was a destroyer in course of construction there.

*Uraga.* The private shipyard which was building destroyer number 11 was so damaged that the work had to be taken in hand elsewhere.

*Hiratsuka.* The naval cordite and explosive factory was partially destroyed; but large stocks were saved.

### EFFECT OF THE EARTHQUAKE.

It is, even now, too early to estimate the effect of the disaster upon Japanese warship construction. All that we know for certain is that some of the smitten dockyards are again partly at work; of the seven light cruisers which the Japanese Government is now building, the work on two is being carried on at Yokohama and Uraga; and the aircraft carrier Kaga is to be converted from a battleship at Yokosuka. Most of the new destroyers and submarines are being built at Maizuru, Sasebo, and Osaka and Kobe, none of which were affected by the earthquake, but part of the work will be undertaken by the damaged yards at Ishikawajima and Uraga. Previous to the earthquake, the light cruisers Isudzu and Yubari, two first-class destroyers (numbers 3 and 5) and one second-class destroyer (number 10) had been completed; four hours before the earthquake a second-class destroyer (number 8) was launched at Uraga dockyard, and escaped damage. Two months later the light cruiser Sendai was launched at Nagasaki, and a few weeks after the earthquake two second-class submarines (numbers 59 and 68) were completed at Kobe.

The naval estimates for the coming year, amounting to £24,420,000, were passed in December; they were reduced by four million pounds from the original figure. This economy will not only make it exceedingly difficult to maintain the efficiency of the navy, but will also delay the completion of the light cruiser and destroyer programmes by about two years. In addition, a project entitled "alterations to capital ships," the main object of which is to fit bulges in accordance with the terms of the Washington Agreement, will not be finished for a considerable time. The naval repairs rendered necessary by the earthquake will be dealt with by supplementary estimates spread over a considerable term of years.

### THE NAVAL AIR SERVICE.

The naval air service programme has likewise been affected by the reduction; the naval air corps will not be up to its designed strength until 1929, when it will consist of 136 machines, which are expected to be distributed as follows:

At Kasumigaura: 7 squadrons and 1 airship squadron, 56 machines.

At Yokusuka: 5 squadrons and 1 balloon squadron, 40 machines.

At Sasebo: 3 squadrons, 24 machines.

At Ohmura: 2 squadrons, 16 machines.

In a sense these hard facts of construction and finance make dry reading; if they are taken as tokens of the nation's courage they are deeply significant.

No review of the Japanese navy during the past year would be complete without some mention of the officers of the high naval command, whose application to duty bore such fruit in these months of calamity and sorrow. Their names and the posts they held at the beginning of December are as follows: Admiral Takarabe, Minister of Marine; Vice-Admiral Okada (since succeeded by Vice-Admiral Baron Abo), Deputy Minister of Marine; Admiral Yamashita, Chief of Naval Staff; Vice-Admiral Horiuchi (since relieved by Vice-Admiral Saito), Deputy Chief of Naval Staff; Vice-Admiral Baron Abo (since relieved by Vice-Admiral Yoshikawa), Controller; Vice-Admiral Nakasato (since succeeded by Vice-Admiral Fujiwara), Chief of the Bureau of Supply; Rear-Admiral Fujiwara (succeeded by Rear-Admiral Masaki), Admiral Superintendent, Yokosuka Dockyard; Rear-Admiral Kobayashi, Chief of the Bureau of Military Affairs; Rear-Admiral Yamanashi, Chief of the Bureau of Personnel; and Captain Suetsugu (since relieved by Rear-Admiral Tosu), Assistant Chief of Naval Staff. Every one of these officers has been closely connected with Great Britain, Admirals Abo, Kobayashi and Tosu having served as naval attachés in London, and have each given a solid contribution to the traditional friendship between Great Britain and Japan.

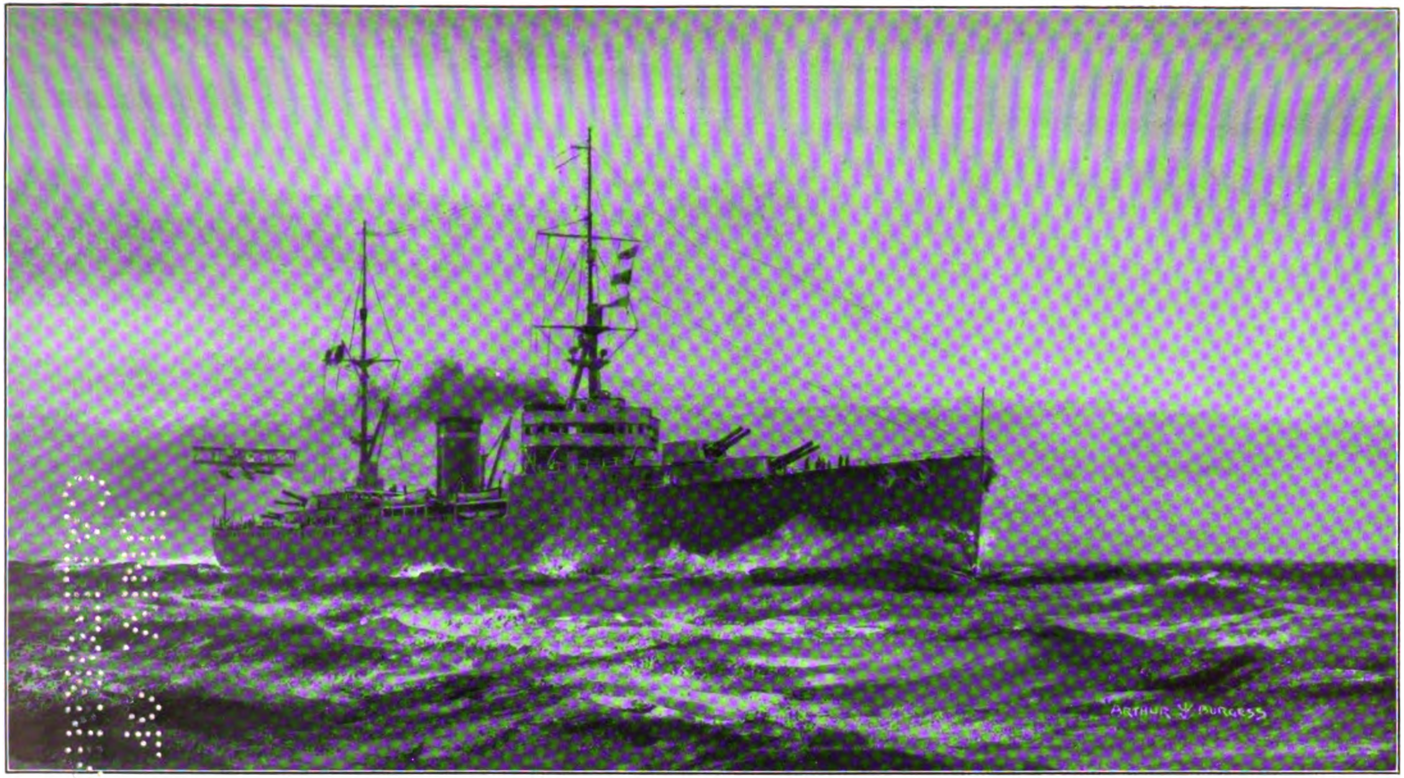
### SUBMARINE DISASTERS.

Unfortunately for the country, the earthquake was preceded or followed by three naval disasters. In the middle of August, 1923, whilst running her trials in Osaka Bay, submarine number 70 foundered and sank with the loss of eighty-eight lives; and a few weeks later (towards the end of October) submarine number 26 foundered at her buoy in Kure harbour. Both these submarines have been salved, but even so their loss does not stand alone, for in March, 1924, submarine number 43 was sunk in a collision with the light cruiser Tatsuta, with the loss of all hands.

The officers and crews of submarines numbers 70 and 43 behaved with great courage and calmness in the face of certain death. Communication was soon established between the sunken, imprisoned crews and the rescue ships on the surface. And until the last hours calm, self-controlled messages, describing how conditions became gradually worse were transmitted from the sunken ships. The officers, in their last moments, sent their farewell messages to the Emperor, and then died of suffocation at their posts of duty.

## FRANCE.

During the past year the French navy has taken shape under the large projects of reorganization described in the last "Annual." Only one new administrative measure of any importance has been



(*From a drawing by Arthur J. W. Burgess.*)

FRENCH CRUISER (PROPOSED TYPE).

laid before parliament during the past twelve months: the second part of the naval building programme. The projected law was concerned only with light cruiser, destroyer, and submarine construction; but when it came before the country a reaction against the extreme doctrines of the *jeune école* had already set in. Some writers, notably the naval publicists of the Vie Maritime still advocated the construction of submarines and aeroplanes, at the expense of every other form of building; but some utterances from Monsieur Laubeuf, the well-known designer, were enough to show that the tide of opinion had turned. He concerned himself primarily with the second half of the building programme, some items of which he criticized severely; and he did not suggest that battleships or battle-cruisers should be taken in hand. None the less certain passages in a paper which he read before the Académie de Marine were significant. His principal argument was that naval building programmes were extended over too long a period; that they made no allowance for the changes in naval tactics which follow on the track of scientific research, and that, in consequence, they had to be changed so drastically that none were ever carried out. He urged that the year 1930 would be a critical one in the history of French naval construction; and that, until then, the Government should undertake nothing beyond the rebuilding of her cruisers, destroyers, and submarines. On the other hand, he made it quite clear that he was not discussing the future of warship construction; but was only concerned with the country's immediate needs: "I do not deny that larger submarines may be necessary later on, for operating against a distant enemy, and that we may have to build battleships, battle-cruisers, and other types of vessels."

## THE BUILDING PROGRAMME.

In this rather altered atmosphere the second section of the building programme came up for discussion, and was reported upon by Monsieur Paul Denise. The original programme instead of being cut down, was virtually increased, by shortening its period; and the measure finally adopted laid down that all the projected ships should be completed by 1928 instead of 1930, as originally intended. Under the revised scheme the increases and replacements in the French fleet, due to the 1922 and 1923 programmes, will be as follows:

| | | | |
|---|---|---|---|
| Light cruisers | (7,800 ton type) | 3 | 9 |
| ,, ,, | (10,000 ,, ,, ) | 6 | |
| Flotilla leaders | (2,400 ton type) | 21 | |
| Destroyers | (1,450 ,, ,, ) | 36 | |
| Submarines | (1,100 ,, ,, ) | 39 | |
| Submarines | (600 ,, ,, ) | 12 | |

The whole plan has not yet been approved, but as a provisional measure the two Chambers have agreed to vote money for building two cruisers, six destroyers, and three submarines. The effect of the programme upon the strength of the French navy cannot be stated accurately until we know what vessels the new ships will replace. It will probably increase the number of cruisers in commission by about four, as five of the French cruisers now in service are very old, and out of date. One thing is certain: the new building programme cannot alter France's maritime position, and does not even lay the foundations for a return to the naval status which she held during the last years of the nineteenth century. It is a project of replacement: to speak of it as a scheme of naval expansion, as some have done, is the merest folly.*

## ADMINISTRATIVE CHANGES AND TRAINING.

The French navy has suffered two rapid changes of leadership during the past year. Just previous to the general election, Monsieur Poincaré reconstructed his Cabinet and appointed Monsieur Bokanowski to succeed Monsieur Raiberti as Minister of the Marine. When Monsieur Herriot took office, Monsieur Dumesnil, a deputy from the Seine et Oise, was appointed to the Rue Royale.

In the Atlantic and the Channel Vice-Admiral Docteur has been in charge of three fleet exercises during the year, which are known only in their broadest outlines. When the combined exercises described in the previous "Annual" were over, the Northern Squadron carried out its usual gunnery and torpedo practices, and in October a new set of exercises were begun. They were designed to test the danger incurred by a fleet which makes a sortie from a harbour which is closely watched by flotillas and submarines. The operations were much complicated by foggy weather. During the month following, the fleet destroyers were put to very severe sea-going tests in the Bay of Biscay; and the sea-going qualities of the ex-German destroyers of the Délage class (900 tons) were compared with those of the French-built boats of the Magon type (850 tons). The French boats are reported to have proved themselves to be the better designed.

In the south, Admiral Dumesnil carried out a series of exercises, which included a battle-cruiser raid into the western Mediterranean by an imaginary enemy operating from the eastern basin.

Later the squadron was engaged in a number of experiments designed to discover the best method of exercising command over submarines operating with a fleet of capital ships. The solution adopted provisionally was to place the officer in charge of the submarines on board the fleet flagship, but it was not found satisfactory; and French submarine officers urged that the submarine commander must be given a surface vessel "to ensure an effective command of the units under his orders and a working *liaison* with the Commander-in-Chief."

## COMBINED OPERATIONS.

Perhaps the most interesting point in the French fleet exercises for the year has been the great attention paid to combined operations. In July, 1923, the northern squadron landed troops near Lorient;

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* For the progress of the new construction, and the details of the ships building, see "Dimensions and Particulars of British and Foreign Warships," given later.

in April, 1924, fresh operations in the Lorient sector were carried out by Admirals Docteur, in charge of the forces at sea, and d'Adhémar, in command of the coast defences; and just previous to the exercises at Lorient, a landing was carried out near Zuydcoote. In the Mediterranean a similar set of practices was undertaken. During the autumn of 1923 Vice-Admiral Dumesnil tested the coast defences of Algeria, Tunis, and Marseilles; and in April, 1924, a regular combined operation was started in the Toulon sector, in which Admiral Dumesnil succeeded in putting his troops ashore in Bormes Road, and in seizing two coastal villages. It is worth while to set out the reason for this remarkable insistence upon coast operations in some detail.

Expert opinion in France is now inclined to think that the country's ability to wage war either by land or by sea depends, in large measure, upon two strategical problems. In the first place, the French Government and high command wish to be quite certain that the navy and the defence forces of the sea frontiers can protect the coasts effectually against raids in force, whether they be bombardments from the sea, or landing parties, covered by a powerful fleet. Unless some means of defence can be devised, French dockyards and coastal arsenals are obviously at the mercy of any opponent who dominates her at sea. Monsieur Georges Boussenot's report dealt with the question at some length, and showed that though French naval and military experts considered that France could not be invaded from the sea, in the strict sense of the word, the problem of defending the coasts against descents by military landing parties about two brigades strong, was a very urgent one. The law organizing the defence of the maritime frontiers was the first step taken towards a solution of this most important matter; and the repeated combined exercises of the fleet during the past year show how closely the French Naval Staff are studying the problem.

### Safety of Army Reinforcements.

The second question which is of vital importance to the country is not so clearly reflected in fleet exercises, but it is none the less present in the mind of every thinking Frenchman: can communications between Southern France and North Africa be kept open against a powerful maritime opponent? that is, will the high military command be able to depend upon the African army in the event of war upon the Continent, and will it be possible to keep the native forces in France up to strength by a regular movement of drafts and stores across the western basin of the Mediterranean? The considered opinions of the French Staff upon this highly significant question are not known. The fleet exercise carried out in July, 1923, when a battle-cruiser passed the watching cordon of ships, and operated against the Toulon-Algiers line, would seem to prove that communications with northern Africa can hardly be kept open against a predominating force of capital ships. This, also, seems to be the opinion of Admiral Degouy, who recently published an article upon the subject in the *Revue des Deux Mondes*, in which he could only suggest that French naval constructors should design enormous submarine transports, capable of carrying men, stores, and guns. He would obviously not urge such methods if he thought it conceivable that the French navy, composed as it now is, could solve the problem. On the other hand, many well-informed persons—amongst them Monsieur Laubeuf—maintain that communications in the western Mediterranean can be kept open by the French navy even though it does not possess a force of first-class capital ships. In their opinion, submarines and flotillas, backed by a really powerful air force can make it impossible for large surface ships to dominate the western Mediterranean. They admit that they can penetrate into it ; but maintain that the waters are so confined that no enemy could undertake major operations on a scale calculated to cut communications permanently, in the teeth of French light craft and submarines, operating from Southern France, Corsica, and northern Africa. Those who hold these opinions supplement them by an important corollary : If France intends to keep open the transport line between her southern coast and Africa, with her present weak naval forces, then she must be prepared to build and equip a fleet of specially rapid transports, with sufficient speed to traverse the less protected zones entirely by night. The whole question is still quite an open one, but as the matter is one of the most urgent problems of French national security, as it is a riddle which must be solved if effect is to be given the French policy of making good her falling birth rate by native armies, we may expect to see the problem dominating French building programmes and fleet exercises for years to come.

## Loss of the Airship Dixmude.

This disaster is already so well known that it can be treated briefly. For several months, the exploits of Commander du Plessis de Grenédan had been remarked on in the European Press. Just before her last journey the Dixmude had completed a cruise lasting 109 hours and covering a distance of 5,000 miles. Early in the morning of December 18, the commanding officer took her from the base at Cuers Pierrefeu, near Toulon, intending to cross the Mediterranean, to fly over the northern part of the Sahara desert and then return. During the 19th and 20th, Commander du Plessis de Grenédan kept in wireless communication with the French shore stations. At half-past six on the morning of the 20th, he was sixty miles north of Touggourt, which lies well in the desert zone to the south of the Algerian mountains, on a northerly course. Early in the afternoon he had fallen in with bad weather, and, after struggling northward all day, turned northeastwards, probably intending to cross the Tyrrhenian Sea and reach Italy. At about ten minutes past two in the morning a last signal was received to the effect that the aerials were being taken in owing to the storm ; and it is thought that, about twenty minutes later, the airship was struck by lightning and set on fire. Her position, when she was destroyed, was about five and a half miles from San Marco lighthouse in Sicily.

A court of enquiry, composed of Marshal Fayolle, and Vice-Admirals Fournier, Touchard, and le Bris, examined every circumstance of the disaster and reported on it fully. They decided that the real cause of what had happened was that the airship had undertaken a journey which did not traverse intermediate landing places. This miscalculation was due to zeal, and over-confidence in the airship, and the court recommended that such collective responsibility as could be proved ought not to be visited upon individuals.

## ITALY.

The Italian navy has now taken shape under Admiral Thaon di Revel's reforms, which were described at length in last year's "Annual." The Adriatic controversy has been settled by a treaty between Jugoslavia and Italy, whereby the town of Fiume passes under Italian sovereignty and Porto Baros goes to Jugoslavia. The Serbo-Croat-Slavene Kingdom has, however, been granted concessions with regard to wharves and docks, which secure it trade facilities which are practically equal to those enjoyed by Italy. This agreement is part of a general treaty whereby the two countries bind themselves to collaborate in maintaining the order of things established by the Peace Treaties of St. Germain, Trianon, and Neuilly; to give each other diplomatic support if either suffers an unprovoked attack by a third Power; and to concert measures for a common defence if international complications arise which threaten their interests. In addition to this treaty, the Italian Government concluded an agreement with Albania, securing to herself the position of the most favoured nation in all commercial questions such as customs, navigation, trading rights and concessions. In the eastern Mediterranean, Italy has been paying great attention to the port facilities and anchorages of the Dodecannese Islands; and steps have been taken to make Leros a strong naval base.

### PROGRESS OF CONSTRUCTION.

The estimates for the past year amounted to about 780 million lire, rather over seven million pounds at the present rate of exchange, and work on the 1924 to 1928 building programme (see "Annual," 1924, p. 64); the first two cruisers have now been taken in hand. The Government seems to contemplate only one important addition to the general programme of naval reorganization to which it is now giving effect. Experts report that the naval base at Maddalena in Sardinia is so exposed to gunfire from the Corsican shore that sooner or later it will have to be abandoned. It is now proposed to replace it by two naval depôts, one at Cagliari and another at San Antioco Bay, but, up to the present, no money has been voted. The three two thousand ton flotilla leaders Leone, Tigere, and Pantera, ordered in 1918, have been completed; and the 900 ton destroyers Curtatone, Castelfiardo, Calatafimi, and Monzambano have been put into service.

## SMALLER NAVIES.

The past year has been interesting in that for the first time since 1919 the smaller states of Europe have had time to think seriously of their naval affairs. Slowly emerging from the financial and political confusion of the last five years, they have at last been able to calculate what sums of money they will be able to spend upon their coastal defence, and how the proposed outlay shall be made. The tendency has been particularly noticeable in the Baltic States, which have almost simultaneously been discussing naval programmes. The Finnish Government have before them a project for constructing 3 gunboats of about 3,000 tons, 2 " chasers " of about 600 tons, and 40 torpedo carrying motor-boats of 25 tons; and the Latvian Parliament has for some time past been discussing a coast defence bill which allows for a considerable amount of minor naval construction. Lithuania is reported to be placing orders for torpedo boats and submarines with the French firm, les Ateliers de la Loire. These are all new states, who are so to speak constructing *ex nihilo;* for the moment they can only be concerned with setting up a system of mobile coast defence, of approximately the same strength as their neighbours, the problems before the older minor Powers are more complicated.

They already possess navies, and are faced with the duty of bringing them up to date at a period when the future of naval construction is very uncertain. It is not fully realized that what has been popularly termed the " capital ship question " has been settled only for the Great Powers. The responsible authorities of a minor naval Power may still ask themselves, with perfect justice, whether they are justified in spending their limited resources upon capital ships or submarines? The problem before them presents itself in this way: if our country comes into conflict with a great naval Power, shall we have any chance of keeping our sea communications with the outer world relatively open? And are we most likely to do so by means of a small force of capital ships, which will never be able to face their opponents, or by a considerable force of submarines, which, whatever their limitations may be, will at all events be able to keep the sea, and put up some protection to our seaborne supplies? Although it has never been stated quite so baldly, it is not difficult to see that this open question has been the underlying cause of a great deal of hesitation in the naval policies of certain groups of minor Powers.

### LIMITATION CONFERENCE IN ROME.

On the fourteenth of February the representatives of the Argentine, Belgium, Brazil, Spain, Sweden, Norway, Denmark, Holland, Russia, Czechoslovakia, Great Britain, France, Japan, and Italy met at Rome, at the invitation of the Council of the League of Nations, to discuss the best way of limiting the naval armaments of minor naval states. The negative results of the conference should not be allowed to obscure its real significance. The discussions of the assembled delegates expressed, in condensed form, the naval ambitions of the Governments which they represented; and, in so far as they do so, they are of the greatest interest.

The draft agreement which the delegates were convened to consider was drawn up on the lines of the Washington compact, which it followed closely; but in all else the two conferences differed entirely. The discussions at Washington were carried on by plenipotentiaries; and were in consequence essentially political: at Rome the delegates were simply naval experts. This very wide difference was apparent in the forms of agreement which those concerned were to contract. The signatory Powers at Washington agreed to limit their armaments, because the negotiators first contrived to settle the political relations between the contracting parties. At Rome matters were not the same. Even if the delegates had been plenipotentiaries, it would obviously have been impossible to draft a political agreement so embracing that it would have given stability to the political relations of so many Powers. The most that could have been done would have been to draw up a series of mutual guarantee treaties: one for the Baltic States, another for the South American Powers, and so on; and even that would have been overwhelmingly difficult. Of course, no such thing was attempted, and the discussions showed that it is almost impossible to examine naval programmes independently of their political background.

Again, the interests of the Powers represented at Washington and Rome differed absolutely. At Washington the principal naval Powers had every possible reason to reduce their armaments simply because they were impoverished by the war, and faced with a colossal naval expenditure. Apart from that, their fleets were at an unsurpassed level of efficiency and equipment, and could be reduced without any loss of naval status. The minor naval Powers are not so placed: what they propose to spend is well within their means, and in many cases their fleets urgently need renewing. These facts must be carefully borne in mind if one is to form a right judgment upon what occurred.

### The Problem of Programmes.

The first task before the conference was to consider whether the discussions should deal with programmes in capital ships and aircraft carriers, or with the total naval tonnage of the States concerned. There were weighty reasons in favour of the second proposal. Even if small naval States construct capital ships, they will always possess so few that low tonnage vessels will be the backbone of their naval strength; and limitations in types of vessels which they are hardly able to build will naturally tempt them to press on construction in other directions. The proposal was rejected, mainly because it was too embracing, but that does not hide its significance. The reason for it was without doubt the fear that minor naval States may be drawn into a fierce competition in submarine building.

The conference was next confronted with a question of great difficulty: should the Powers concerned examine a programme for reducing their naval armaments all together or in separate groups? As soon as the two alternatives were examined it must have been apparent to all concerned how very difficult it is to discuss naval armaments independently of policy. The proposal went to the roots of naval rivalry. Competitive programmes are, after all, the outcome of rival policies, which generally exist when States are near neighbours. It is hard to imagine that the total tonnage of the Swedish navy could ever be a matter of any concern to the Brazilian Government; though it might be to Norway, Denmark, and Russia: conversely the naval armaments of Brazil, the Argentine, and Chile are not likely to interest States outside South America. It therefore seemed more likely that agreement would be reached if the Powers concerned were divided into geographical groups, and allowed to discuss their armaments amongst themselves. Whilst admitting that the plan had much to recommend it, the conference found that it raised insuperable difficulties. Russia, for instance, is both a Baltic and a Mediterranean Power; and it would obviously be impossible to treat her Baltic and Black Sea fleets independently of her total naval strength. Holland, also, is a North Sea and an East Indian Power.

## RELATIVE STRENGTH IN CAPITAL SHIPS.

Having discussed these preliminary questions, the conference examined the draft agreement submitted to it. As presented, the document closely followed the Washington compact (see "Annual," 1922, pp. 397 *et seq.*). The fourth article in the first chapter laid down the capital ships that each signatory was to retain; and was little more than a list of all ships displacing 3,000 tons and upwards, which are at present on the navy lists of the signatory Powers. The fourth article which was left open, was to decide the total tonnage in capital ships which each State was to possess. Until this article could be completed no progress could be made, and a long discussion was focussed upon it. Figures might have been drawn up had it been possible to agree to the principle of a ten years' naval holiday; but this was found to be impossible, as a date from which to begin could not be settled. Again, it might have been possible to come to a definite arrangement by agreeing that the fleets of each signatory might be brought up to the tonnage at which they stood on a particular date; but this also was found impracticable. Two dates were suggested: 1914 and 1921; but the adoption of either would have been unjust to those Powers who have been endeavouring for the last ten years to bring their fleets up to a definite standard, and have been prevented from doing so by the war.

In the end it was decided that each Power should submit its requirements separately, and that the article under discussion should be drafted in accordance with the proposals made. As it is clear that the matter submitted to the conference in answer to this general invitation represents the naval ambitions of all the minor states in Europe and America, it should be set out in detail:

| | Present tonnage in capital ships. | Tonnage required. |
|---|---|---|
| Brazil | 44,724 | 80,000 |
| Chile | 34,000 | 80,000 |
| Denmark | 13,139 | 18,000 |
| Greece | 36,000 | 36,000 |
| Netherlands | 26,550 | 60,000 |
| Norway | 16,048 | 16,048 |
| Spain | 81,072 | 105,000 |
| Sweden | 60,000 | 60,000 |
| Russia | 340,538 | 490,000 |

### Revelation of Naval Aims.

It will thus be seen at a glance that Brazil and Chile desire practically to double their existing tonnage; that Spain requires roughly a twenty-five, and Russia about a thirty per cent. increase in their present fleets. It should be added, moreover, that, in the case of Brazil and Chile, the proposals made are far in excess of their present programmes. Brazil is at present constructing a small monitor, and Chile has no ships either laid down or projected. The figures submitted were, however, coupled with the important proviso, that Brazil and Chile would only limit their capital ship tonnage to 80,000, if the Argentine did the same. As the Argentine delegate was only empowered to watch the proceedings, no answer was given. The Chilean and Brazilian proposals, therefore, turn upon the condition of the Argentine navy, which slightly exceeds the 80,000 ton figure if the cruisers Pueyrredon, General Belgrano, General San Martin, and Garibaldi are counted as capital ships. That they should be so counted is evident if their fighting strength is compared with that of certain vessels included in the lists attached to the original draft agreement. The Brazilian and Chilean proposals therefore practically invited the Argentine to agree to a scrapping programme; and showed that both countries wish to bring their navies up to the Argentine standard. It should be added that the conference was in entire sympathy with the proposals made, and voted them unanimously.

### Russian Plans and Reservations.

A similar approval was not forthcoming when the Spanish and the Russian proposals came up for discussion: Great Britain, France, Italy, Holland, and Norway voted against Spain; and Great Britain, France, Italy, Japan, and Sweden against Russia.

The Russian and Spanish delegates defended their proposals with great ability. Monsieur Berens, the representative of the Soviet Republics, showed that he was simply asking for the tonnage that his country had actually possessed in 1921, one of the dates recommended as a starting point for the naval holiday, and that, as Russia had a fleet of 540,000 tons in 1917, he was not asking for a return to the pre-war figure as had been suggested. Seeing, however, that his arguments were not likely to cause a revision of the vote, he made a second undertaking on behalf of his Government, of which the gist was that " the Union would be satisfied with a total tonnage amounting to 280,000 tons ; but only provided that the following conditions are accepted :

" (i) That the Council of the League of Nations is replaced in the draft by another organization.

" (ii) That the Bosporus and the Dardanelles are closed in accordance with the proposal which we made at the Lausanne conference.

" (iii) That vessels of war belonging to non-riparian States of the Baltic are forbidden access to the Baltic by the Sound and the Belt.

" (iv) That the Straits of Korea are disarmed.

" (v) That the vessels of war at present retained at Bizerta are restored to the Union."

Such conditions could not be discussed by technical experts, and the conference simply placed them on record.

### THE POSITION OF SPAIN.

The Spanish proposal for a capital ship tonnage of 105,000 tons can best be explained in the actual words used by the Marques de Magaz :

> " The Spanish representative at the Conference for the extension of the principles of the Washington Treaty desires to call the attention of the Council to the following facts.
>
> " Spain is the only second-class Naval Power which has proposed an effective limitation of her naval armaments.
>
> " The Argentine, China, and Turkey have not undertaken to effect a limitation.
>
> " The limitation accepted by Brazil, Chile, Greece, and Sweden is subordinate to the acceptance of certain conditions by the Argentine, Turkey, and the Baltic Powers respectively. As these conditions have not been secured, the limitations accepted by Brazil, Chile, Greece, and Sweden are not effective.
>
> " Spain, on the other hand, proposed to limit her naval armaments in capital ships to 105,000 tons ; she accepts this figure, however, without making any conditions, thus proposing an immediate effective limitation. Further, she would have had no difficulty in agreeing to 82,000 tons as a limit, upon condition that the latter figure was accepted by all riparian Powers of the Western Mediterranean in accordance with the rule adopted by the Commission for the South American Powers, for Sweden and for Greece.
>
> " Notwithstanding the above consideration and the fact that Spain, which could derive no benefit from limiting her freedom of action in regard to naval armaments, did not ask the Commission for any compensation for this offer, the majority decided that the offer should not be accepted and it received only four votes.
>
> " The Spanish representative wishes to bring these facts to the knowledge of the Council, in order that the latter may be in a better position to appreciate the reasons for which Spain is not included among the Powers which have assented to the draft Convention."

There is undoubtedly a marked contrast between the unanimous approval given to the Brazilian and Chilean proposals to increase their navies by 100 per cent. and the Spanish proposal to increase hers by 25; but it should not be suggested, on that account, that the adverse votes were due to bias or unreasoning opposition. Conscientiously as the delegates endeavoured to obey their terms of reference, by keeping the discussion free of political arguments, the representatives of Mediterranean Powers could not examine a Spanish proposal to increase her naval armaments as

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(From a drawing by Arthur J. W. Burgess.)

SPANISH LIGHT CRUISER PRINCIPE ALFONSO.

(See pp. 412 and 486.)

dispassionately as they could view a similar proposal from a distant trans-Atlantic republic.

In conclusion, it should be remembered that the conference at Rome was never intended to be more than a mere preliminary. The League of Nations appears to be paving the way for a general conference which shall include policy in its terms of reference. To have succeeded in obtaining an authentic, reliable record of the naval aims of the smaller States of Europe and America is, in itself, a great achievement.

A. Colquhoun Bell.

# CHAPTER III.

## COMPARATIVE NAVAL STRENGTHS.

THE battle fleets of the five Naval Powers which took part in the Washington Conference now correspond to the ratios fixed in the Treaty. The ratios applied only to capital ships and aircraft carriers. No country was called upon to scrap any vessels of the latter class, as all the Powers were, and still are, below the tonnage severally allotted to them. On the other hand, the agreement provided that forty-five existing capital ships should be sent to the ship-breakers, and that nineteen vessels of the same type in course of construction—4 British, 11 American, and 4 Japanese—should also be scrapped; 2 American battle-cruisers, which were then building, as well as 2 incomplete Japanese battle-cruisers, were set aside for conversion into aircraft carriers. As a result of this policy the battle fleets of the Powers have assumed the exact strength laid down by the Treaty as is revealed in Table I. The calibre of their guns and the elevation of the guns, the character of the fuel as well as the speed, and their general equipment, correspond with the intentions of the naval advisers of the Powers represented at Washington.

An understanding was reached when the Treaty was negotiated that the units in the battle fleets should not be modernized. It was specifically laid down that " no retained capital ships or aircraft carriers shall be reconstructed except for the purpose of providing means of defence against air and submarine attack." But it was added that " the contracting Powers may for that purpose equip existing tonnage with bulge or blister or anti-air attack deck protection, providing the increase of displacement thus effected does not exceed 3,000 tons (3,048 metric tons) displacement for each ship." It was specifically provided that " no alterations in side armour, in calibre, number or general type of mounting of main armament shall be permitted." France and Italy were, exceptionally, allowed to increase the armour protection of any of their retained ships and to raise the calibre of the guns carried " so as not to exceed 16 inch (406 millimetres)," none of their vessels having been completed since 1916. The work then in hand on the British battle-cruiser Renown was to be completed. The obvious intention was to check any policy of reconstruction of capital ships as might upset the balance of strength of the various battle fleets as set forth in the Treaty.

### The Construction of Cruisers.

It was remarked in the last issue of the " Annual " that " while the Washington Treaty has arrested the building of capital ships throughout the world, there is considerable activity in other directions." Specific reference was made to light cruisers. It has since been asserted by certain M.Ps., during the debates in the House of Commons on the Admiralty's proposal to lay down five light cruisers, that this action is calculated to lead to a recrudescence of naval rivalry, not, as in the past, as regards capital ships, but as regards light cruisers.

It may be recalled in this connection that the representatives of France, Italy, and the British Empire, while agreeing that no light cruisers to be built during the life of the Treaty should exceed 10,000 tons displacement, or carry a more powerful gun than the 8-inch gun, specifically declined to accept any ratio affecting the strength in light cruisers or other auxiliary craft, in view of their varying strategic needs.

The statement that any country is lending itself, in a spirit of rivalry, to the building up of a great strength in cruisers, merits close examination. The evidence is overwhelmingly against this assertion, as the figures in the table on this page indicate. It enumerates the number of cruisers possessed by the five leading Naval Powers in 1914 (on the eve of the outbreak of the Great War); in 1921 (when the Washington Naval Treaty was signed); and in 1924, together with an estimate of the number which each fleet will possess in 1928, when the vessels now building will have been completed and older vessels will have reached the 20-year limit from the date of completion.

Strength in Cruisers and Light Cruisers less than 20 Years old from Date of Completion on March 31 of each of the Years given.

| | 1914. | | | 1921. | | | 1924. | | | 1928. |
|---|---|---|---|---|---|---|---|---|---|---|
| | Built. | Building. | Total. | Built. | Building. | Total. | Built. | Building. | Total. | Built. |
| British Empire | 108 | 18 | 126 | 55 | 10 | 65 | 50* | 4 | 54 | 57 |
| United States | 30 | — | 30 | 19 | 10 | 29 | 25 | 3† | 28† | 24‡ |
| Japan | 27 | — | 27 | 13 | 7 | 20 | 17 | 6 | 23 | 28§ |
| France | 30 | — | 30 | 20 | — | 20 | 11 | 3 | 14 | 14 |
| Italy | 20 | 3 | 23 | 15 | — | 15 | 14 | — | 14 | 15 |

It will be seen that in 1928 all the Powers, except Japan, will be weaker in cruisers than ten years ago. The number of British vessels will have decreased by more than one-half—from 126 to 57. The strength of the United States will have dropped from 30 to 24; France will have 14 instead of 30; and Italy 15 instead of 23. On the other hand, there will be 28 cruisers under the Japanese flag in 1928 instead of 27 in 1914.

The position in respect to other auxiliary naval craft has undergone little change since the last issue of the " Annual." The United

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* Includes Courageous and Glorious, now being converted into aircraft carriers.

† Excluding 8 projected but not authorized.

‡ Includes 8 projected but not yet authorized (Sept. 1924).

§ Assuming that all cruisers of present authorized programme have been completed by March 31, 1928, except for two 10,000 ton cruisers which are to be completed by March 31, 1929.

States possesses nearly twice as many submarines as the British Empire—116 as compared with 61, and the American fleet includes 295 destroyers to 203 of the British Empire; but the British fleet includes 16 flotilla leaders, whereas there are none under the American flag. Two flotilla leaders and 2 destroyers are building for the British fleet, but none of either class in American yards. Japan, France, and the United States have in hand, as will be seen from the appended tables, 22, 21, and 10 submarines respectively, while only 7 are building for service in the British fleet.

While it is true that Japan, France, and the United States, and Japan in particular, are still devoting considerable attention to the construction of submarines, there is no foundation for the statement that anything in the nature of a rivalry in light cruiser building has developed. In view of the decline in the number of British cruisers during the past ten years, and the obsolescence of many of the cruisers still retained, the assertion that either the Mother Country or the Dominions are forcing the pace in respect of this type of vessel is proved to be a figment of the imagination.

THE EDITORS.

# CHAPTER IV.

## LIGHT CRUISERS.

IN the "Annual" for 1923 I ventured to express the opinion that no first-class Power should be satisfied to accept in their 10,000 tons cruiser design under Washington Conference conditions a smaller aggregate of fighting efficiency than was outlined in that article, namely, a displacement of 10,000 tons, a speed of 34 knots, and armament of eight 7½-inch or 8-inch guns, with an auxiliary armament of not less than 4-inch high angle guns. In this chapter I propose to outline some of the variations possible within the limits of the Conference displacement, after briefly stating the position these cruisers are to occupy in the scheme of the war fleet, and some of the considerations leading up to the vital features to be embodied in the design.

### THE INFLUENCE OF BATTLESHIP DESIGN ON CRUISERS.

A decision as to the essential qualities of the light cruiser type depends largely on the effect of the Washington restrictions on the capital ship itself. The Conference recognized the battleship as the primary unit of the battle fleet, but limited its displacement and the calibre of its primary armament. In the present state of our knowledge, with speed as a vital condition, these restrictions only serve to increase the difficulties of affording adequate protection to a costly unit without undue sacrifices in other directions. One of the most essential qualities of a self-contained primary unit is its speed at sea under normal weather conditions. The value of this quality has so far reached its highest appreciation in H.M.S. Hood. With the imposed limitations, it is at present impossible to obtain a speed in the region of 30 knots without considerable sacrifice in gun power or armoured protection. It is probable, therefore, that the principal sacrifice will be in speed. In my contribution to the 1923 "Annual" I assumed that the speed of the battleship of the immediate future would lie between 24 and 30 knots, and there appears to be no reason to modify that assumption, which assists materially in the determination of the essential factors of the light cruiser design.

The inferiority of the cruiser in armament and protection must be compensated for by greater rapidity of movement, and the use of light but formidable weapons. It should be designed primarily to act with the battle fleet, and yet be capable of detachment for commerce protection, scouting, and the many other duties demanded of this type in time of war. Obviously, it should have a large radius of action, present the smallest possible target to the enemy's fire, and be fitted with every conceivable labour-saving device to limit the number of its crew. Each advance in speed of the capital ship reduces the possibilities of attaining within moderate dimensions the ideal type outlined above.

While the Conference restrictions have deterred all the principal naval Powers from advancing to the practically invulnerable type of battleship described in my article in the " Annual " of 1920-21, the late war gave us the opportunity of obtaining a practical knowledge of the effect of passing to the maximum possibilities in light cruiser design. It may therefore be of interest to discuss briefly the results already achieved previous to any analysis of the vessels now under construction for the various naval Powers, and proposals for a new type.

## THE BRITISH COURAGEOUS CLASS.

It is not my intention to criticize the policy which led to the design of the Courageous class with its striking departure from the fundamental principles already indicated. It is important, however, to show the effect on armament, speed, and protection of increased dimensions, and to deduce therefrom some data for application to the design of light cruisers within the limits prescribed by the Conference. In the first place, a comparison should be made of the distribution of weights in the Courageous of 22,000 tons and 31½ knots and in a light cruiser of 4,500 tons and 29 knots. In each case the figures represent the percentages for the fully loaded or deep condition.

| Items. | Courageous. | 4,500 ton Cruiser. |
|---|---|---|
| Hull and fittings .. .. .. | 38·0 | 42·0 |
| Armour and protection .. .. | 17·0 | 7·0 |
| Equipment .. .. .. .. | 3·5 | 5·5 |
| Armament .. .. .. .. | 11·5 | 5·5 |
| Machinery .. .. .. .. | 15·5 | 19·8 |
| Fuel .. .. .. .. .. | 14·5 | 20·2 |
|  | 100·0 | 100·0 |

The effect of passing to large dimensions is at once apparent in the increased percentages which may be allocated to armament and protection. The result would have been even more favourable if the heavy 15-inch guns and their mountings had not been introduced in the Courageous, as these mountings require very substantial and heavy steel supports, the weight of which is included in the item " hull and fittings." The total weight of armament amounts approximately to 2,600 tons, of which the 15-inch guns with their mountings and ammunition account for over 2,200 tons. The structural supports and the armour for the barbettes correspond roughly to 680 tons. There is, therefore, a total weight of 2,880 tons absorbed by the four 15-inch guns, a great part of which, with the adoption of smaller primary guns, might have been utilized for a substantial increase in the number of guns of the main armament and the provision of a very formidable torpedo equipment. This class would then have approximated to the fundamental requirements governing light cruiser design. The Courageous had a speed of 31½ knots, and carried only two 21-inch torpedo tubes. The whole weight of the secondary armament, inclusive of torpedo equipment, is less than 350 tons. From the above it is abundantly clear that a highly efficient light cruiser superior to anything afloat can be produced on a much smaller displacement than that of the Courageous. While the Courageous class furnishes the only instance of an attempt to embody in a light cruiser an armament equal to that of a battleship or battle-cruiser, it would be imprudent to dismiss from consideration the possibility of other naval Powers introducing large calibre guns into vessels of this type.

### THE BRITISH RALEIGH CLASS.

The Raleigh class, designed in 1915 for world-wide work, is of special interest, as it probably influenced the members of the Washington Conference when they limited future cruisers to a displacement of 10,000 tons, and the calibre of their guns to 8 inches. This class has a length between perpendiculars of 565 feet and a normal displacement of 9,750 tons. The main armament comprises seven 7·5-inch guns, a secondary armament of twelve 3-inch guns, and six 21-inch torpedo tubes. The speed is 30 knots, and the fuel capacity ensures a large radius of action. These vessels were undoubtedly designed to deal with the German intermediate cruisers which were then attacking our merchant ships on the high seas.

### THE RELATION OF LIGHT CRUISERS TO DESTROYERS.

It is reasonable to assume that cruisers of the immediate future will approximate to the maximum figures for displacement and armament of the Washington Conference, and that all designs will embody as governing factors the fundamental principles already enunciated. Reference has already been made to the speed of the light cruiser relative to the primary unit of the fleet, and at the other end of the scale the destroyer has to be taken into account. The light cruiser acts as a connecting link between the two. Its protection and armament are inferior to the battleship but superior to that of the destroyer, and the measure of this superiority must be the measure of the accepted disadvantage in speed. An exact balance cannot be determined by purely theoretical considerations. It involves the question of the fighting range, and the maximum can be secured only by absolute superiority in speed and gun power.

An analysis of a typical destroyer on the basis of the percentage figures given in the earlier part of this chapter shows the various factors to be disposed as follows :—

| | |
|---|---|
| Hull and fittings .. .. .. .. .. .. | 35·0 |
| Equipment .. .. .. .. .. .. | 4·5 |
| Armament .. .. .. .. .. .. | 4·0 |
| Machinery .. .. .. .. .. .. | 36·0 |
| Fuel .. .. .. .. .. .. .. | 20·5 |
| | 100·0 |

The percentages allotted to the different items refer to no particular type or class, but indicate approximately the average values for all types built during the last ten years. To secure the high speed required for the destroyer the machinery and fuel demand between 55 and 60 per cent. of the load displacement, and with this proportion the later types reach 36·5 knots. This high speed is attained only by a corresponding sacrifice in offensive armament. The recent types of flotilla destroyers carry five 4·7-inch guns with six 21-inch torpedo tubes, and have no protection. As the cruiser occupies some intermediate place between the battleship and the destroyer, then if it is assumed that the speed of the battleship is not likely to exceed 30 knots, and the speed of the destroyer is about 36 knots, a rough approximation to the minimum speed of the light cruiser is 33 knots, the speed of our Emerald class.

### The Light Cruiser versus Battleship.

Assuming the general acceptance of this minimum speed, the weight advantage in machinery and fuel of the cruiser relative to the destroyer should be utilized in securing a marked superiority in artillery and torpedo armament and in protection. On the other hand, these are of no avail against the battleship, and neither in calibre of guns nor in thickness of protection (with a corresponding sacrifice in other qualities) should any attempt be made to compete with the primary unit. The gun-power and protection of the cruiser should be determined mainly by reference to the destroyers, the defence of the cruiser against the battleship must rest on its higher speed, its provision of a formidable torpedo equipment, and an armament equal or superior to the secondary armament of the primary unit.

The primary armament will probably not be based on any such logical consideration, but on the fact that the Conference permitted a maximum calibre of 8-inch guns for the primary armament of cruisers, so that the naval authorities of each maritime Power, being confronted with the possibility of their cruisers being opposed by a more heavily armed type, will assuredly make use of the maximum offensive gun-power allowed under the Washington restrictions, namely, 8-inch. By a fortunate occurrence such a gun meets the conditions just enumerated, being at once superior to any destroyer armament and to the secondary armament of the primary unit. The Emerald class with its seven 6-inch 50-calibre, etc., guns, twelve 21-inch torpedo tubes, and its speed of about 33 knots, on a displacement of 7,550 tons, is a striking example of an efficient light cruiser, but with the main armament slightly on the weak side as judged from present considerations.

### The Elements of the Washington Cruiser.

The foregoing deductions do not necessarily confine one's ideas within definite limits. Having fixed the speed and learned the requirements of the naval tactician respecting radius of action and, therefore, fuel capacity, we have yet to determine the possibilities in gun-power, torpedo equipment, and protection within the area of the 10,000 tons displacement. Of the three factors the torpedo equipment is, perhaps, the one most easily disposed of. We have already advanced to twelve torpedo tubes mounted in groups of three. This equipment is, therefore, already a formidable one and probably sufficient for the purpose. Progress will lie in larger torpedoes, with increased range, and greater accuracy of control. Much has been done in recent years to increase efficiency in these directions, but much still remains to be done in order that the cruiser may play its part effectively in a naval battle.

## GUNS.

It is always a difficult problem to strike a fair balance between gun-power and protection. No more than about 20 per cent. of the displacement can be allotted to these two factors. In the first place, as already stated, the calibre of the guns should not be less than the secondary armament of the battleship, and should be superior to the armament of the destroyer. Preferably it should be superior to both, but the measure of its superiority over the secondary armament of the battleship should be limited by the necessity of ensuring a rapid discharge of projectiles to counter destroyer attack. The comparative rate of discharge per minute from the various calibres now in use are given in column 1 of Table I, the rate for the 4·7-inch gun being a unit figure; thus the 8-inch gun can fire only one projectile for three from the 4·7-inch gun. As to column 2, the destructive range of the projectiles varies approximately as the cube of the calibre. For comparison the destructive range of the 4·7-inch gun has again been taken as unity. The product of the rate of fire and the factor for destructive range affords us some guidance in arriving at a decision as to the relative efficiency of the guns. Again, as we advance to the higher calibres the weight of the guns, mountings, and ammunition rapidly increases and, therefore, the number carried must correspondingly diminish. An approximate idea of the effect on volume of fire in passing to the higher calibres may be obtained by dividing the products in column 3 by the weights of guns, mountings, and ammunition. Relative values resulting from this calculation are shown in column 4.

TABLE I.—COMPARATIVE EFFICIENCY OF GUNS FOR LIGHT CRUISERS.

| | Rate of fire. | Factor for destructive range. | Product of 1 & 2. | Volume of fire for given total weight. |
|---|---|---|---|---|
| 4·7-inch .. .. | 1·00 | 1·00 | 1·00 | 1·00 |
| 5·5-inch .. .. | 0·92 | 1·61 | 1·48 | 0·71 |
| 6·0-inch .. .. | 0·83 | 2·07 | 1·72 | 0·66 |
| 7·5-inch .. .. | 0·42 | 4·09 | 1·72 | 0·40 |
| 8·0-inch .. .. | 0·33 | 4·92 | 1·62 | 0·27 |

## ARMOUR PENETRATION AND RANGE OF CRUISER GUNS.

While this method of attacking the problem assists us materially, its solution in practice may depend on other influences such as the higher penetrative effect on armour of the larger calibres and the closely allied factor of fighting range. At ranges between 6,000 and

10,000 yards the penetrative effect of modern guns and explosives varies very approximately as the square of the diameter of the guns, assuming length and diameter to bear an equal ratio. The citadel of the battleship is practically invulnerable against any of the guns included in Table I., but the forward and after ends of the ship are open to attack, and if it is contended that the cruiser should have at its disposal every available means of inflicting damage on the primary unit, then some sacrifice in rapidity or volume of fire must be accepted relative to the destroyer, and with this in view the 8-inch 50-calibre gun (the limit fixed by the Washington Conference) appears best to meet the case.

## PROTECTION OF LIGHT CRUISERS.

In coming to a decision respecting the number and sizes of guns to be carried in the up-to-date cruiser the question of protection must be considered. However desirable it may be to have a small target, the high speed required will largely determine the length of the vessel, which will be anything from 550 to 590 feet, with a beam approximating to 66 feet. A large area has necessarily to be protected, whether the protection is distributed horizontally or vertically. A small reduction in speed or in the number of guns affords no material assistance in this direction. However the problem is viewed within permissible limits, it is found that at any range less than 10,000 yards, it is impossible to protect the cruiser against the secondary armament of the battleship, whilst an efficient measure of resistance can be assumed against the destroyer in the more powerful guns of the cruiser.

Viewed from all points it appears inevitable that we should employ the maximum calibre of gun permitted by the Washington Convention, together with machinery for the highest speed, utilizing (particularly in way of the main armament and magazines) the unappropriated weight for protective purposes in the horizontal rather than the vertical direction, so as to furnish a defence against aircraft and plunging shot. The vessel should also be protected by an extensive system of watertight subdivision against submarine attack, although the most effective defence against this must always be high speed.

## CRUISERS AND AEROPLANES.

For offensive action against aeroplanes guns of as large calibre as possible should be fitted, and experience points to the 4·7-inch 45- or 50-calibre high angle guns as the most efficient for this purpose, with the added merit that they can also be used to repel torpedo-destroyer attack.

It is reported that the cruisers contemplated by France and the United States of America embody an arrangement for stowing, and launching by catapult or otherwise, one or more aeroplanes. There is no doubt that such an installation is desirable if some arrangement could be found whereby the aeroplanes could be carried and launched without interfering in any way with the disposition and efficiency of the main guns or auxiliary anti-aircraft artillery, and at the same time be disposed in such manner that if wrecked by enemy gun-fire their debris would not hamper the efficient working of the vessel or her armament.

Everything, however, is against the possibility of such an arrangement not interfering with the primary duties of the cruiser. If the need of aircraft in conjunction with light cruisers is desirable—and it would certainly appear to be so—the question arises whether an independent unit, namely, a modified cruiser type with equal or greater speed, but with a reduced number of guns, should be designed for the purpose of accompanying the light cruiser squadrons in their work. Until some great advance has been made in the method of stowing aircraft economically as regards space on shipboard and in projecting them therefrom, the efficient design of the fighting cruiser should not be jeopardised by the introduction of appliances which, whilst of importance in themselves, reduce by their stowage and launching gear the fighting qualities of the vessel on which they are accommodated.

## SUMMARY OF ESSENTIAL CONDITIONS IN A CRUISER.

Before proceeding to mention the cruisers now being constructed by some of the larger maritime Powers, or attempting to outline the various features which may be embodied in a new design, it is necessary to emphasize the following points :—

(1) Protection, either horizontally or vertically, could under no conceivable conditions render the vessel safe under the artillery attack of a battleship or similar cruiser, or, for that matter, even from the guns of a destroyer if by chance the vessels met unexpectedly within short range. Therefore, protection is the feature which one can best afford to neglect in the design. As, however, the upper deck (for strength purposes alone) has to be comparatively thick, then any available weight should be applied in the horizontal direction so as to add to the protective efficiency of such structural deck or decks.

(2) Speed, coupled with heavy armament, being all essential, the vessel should have the maximum speed compatible with a reasonable number of largest calibre guns, even if the protection of the vessel and guns is reduced to a minimum.

(3) The interior of such a cruiser is so fully occupied by boilers. machinery, and magazines that it is not humanly possible to provide by bulkheads, watertight compartments, or other methods of underwater protection, immunity from torpedo or mine attack. Therefore, while in the interest of ordinary safety it is advisable to keep the vitals as far away as possible from the sides and to subdivide to the fullest possible extent, it must be recognized that the explosion of a large mine or of a torpedo with a powerful warhead would, in the majority of cases, utterly wreck and destroy the vessel.

(4) The installation of efficient fire control and director firing is essential; this being, as Mr. Arthur Pollen well puts it, successful only in so far as it ascertains, integrates, and impresses upon the

sight the varying distances between two moving ships, thus eliminating change of range, in conjunction with an apparatus referred to by Commander Georg von Hase as a triumph of the human brain, enabling the loaded guns to fire automatically at the moment when the telescopic sight is on the enemy and after allowing for the amount of roll on the ship.

## Washington Cruiser Designs of Foreign Powers.

Information as to the various types of cruisers now under construction or to be constructed in various maritime countries is necessarily vague and somewhat uncertain, but the following indicates to some extent the position, subject to modification:—

*United States of America.*—10,000 tons displacement, eight 8-inch guns, speed 33 knots, armoured side protection, fitted with bulges, and carrying two or more aeroplanes.

*Japan.*—Displacement 10,000 tons, length 600 feet, eight 8-inch guns with anti-aircraft battery of 4-inch guns, speed 32 to 33 knots, twelve torpedo tubes, 3-inch to 4-inch side armour.

*Italy.*—Displacement 10,000 tons, length 640 feet, beam 67 feet 6 inches, speed 34 knots, armament eight 8-inch guns with 4-inch anti-aircraft guns, side protection 2-inch to 3-inch, horizontal protection 1-inch to 2-inch.

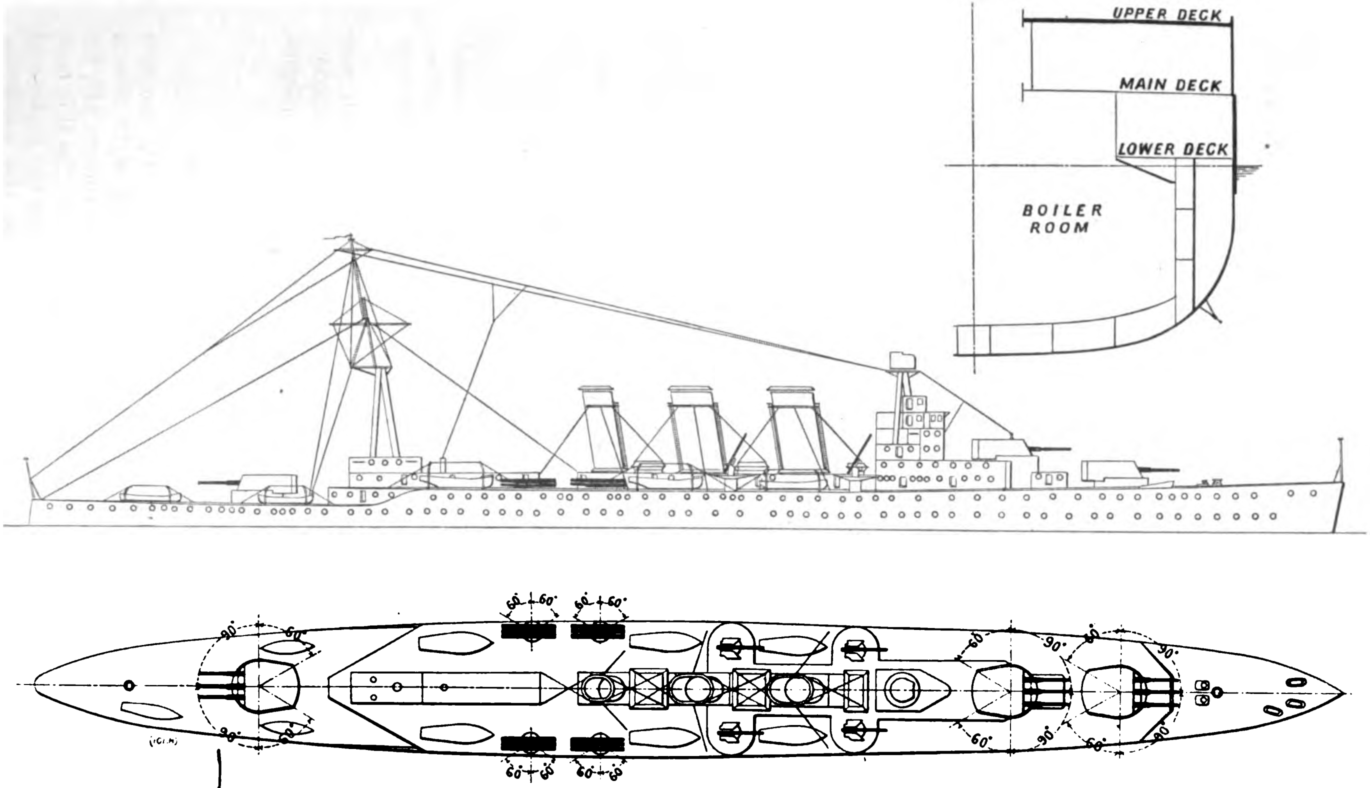
*France.*—Displacement 10,000 tons, length 607 feet, breadth 62 feet 4 inches, draft 19 feet 2 inches, speed 33 knots, armament eight 8-inch guns, eight 3-inch anti-aircraft guns, eight 40 mm. guns, and two triple 550 mm. torpedo tubes, arrangements for carrying two or more aeroplanes.

## Proposed Design where Speed Predominates.

The foregoing leads finally to the question of the determination of the most effective ship of this particular type which can be constructed under the Washington restrictions when coupled with the physical limitations imposed by natural laws. There will be in this case, as in that of all others relating to the design of any particular type of warship, a wide divergence of opinion amongst experts, but I personally am, unhesitatingly, in favour of the greatest speed and the heaviest armament possible, leaving to protection such weight as may be available thereafter. I purpose, therefore, taking as a base one of the most powerfully armed and speediest 10,000 ton ships possible, followed by a few variations of such basic design to illustrate possible changes in the same, whilst still keeping within the Conference limit and without sacrificing the vessel's fitness for the particular position she is destined to occupy in the fleet.

The 10,000 tons displacement refers to that fixed by the Conference and does not include fuel, although this has been taken into account in arriving at the speed of the vessels, so that in every case the fuel has to be added to the 10,000 tons already quoted.

The elevation and gun deck of this basic design, referred to as "A," are shown on the opposite page, and a sketch of the same vessel



Design of Light Cruiser, Type "A."

Length, 590 ft.; displacement, 10,000 tons; speed, 35 knots; armament, nine 8-in., four 4·7-in. h.a., twelve 24 in. torpedo tubes. Protection, 1 in. to 3 in. on sides, 1 in. to 1¼ in. on barbettes and deck.

at sea is given on the Plate facing page 1. This vessel is designed for a speed of 35 knots, with a main armament of nine triple mounted 8-inch guns, two turrets forward and one aft, together with auxiliary armament of four 4·7-inch high angle guns, and twelve 24-inch torpedo tubes. The dimensions and other particulars of the vessel are as follows :—

| | |
|---|---|
| Length .. .. | 590 feet. |
| Displacement .. | 10,000 tons. |
| Speed .. .. | 35 knots. |
| Armament .. | Nine 8-inch guns triple mounted in three turrets, two forward, one aft.<br>Four 4·7-inch high angle guns, mounted on the upper works.<br>Twelve 24-inch torpedo tubes, triple mounted on the upper deck. |
| Protection .. | 1 inch to 3 inches on the sides, 1 inch to 1¼ inches on the barbettes and deck.<br>No bulge.<br>Two decks over the boiler-rooms and three decks over the engine-rooms. |

In this design the weight available for protection has been used partly in thickening as far as possible the upper deck in conjunction with vertical side armour over the vitals and gun positions.

The section for design " A " given on page 67 is arranged without a bulge, protection against torpedo and mine explosion being provided by fitting two bulkheads to form a cofferdam. The design differs in this respect from the ordinary present-day cruiser construction, where a double bottom only is fitted. In this arrangement the side protection of 3 inches extends from 3 feet below the deep water line to the main deck, with 1 inch between the main and upper decks, the horizontal protection being limited to the amount of material required for strength purposes.

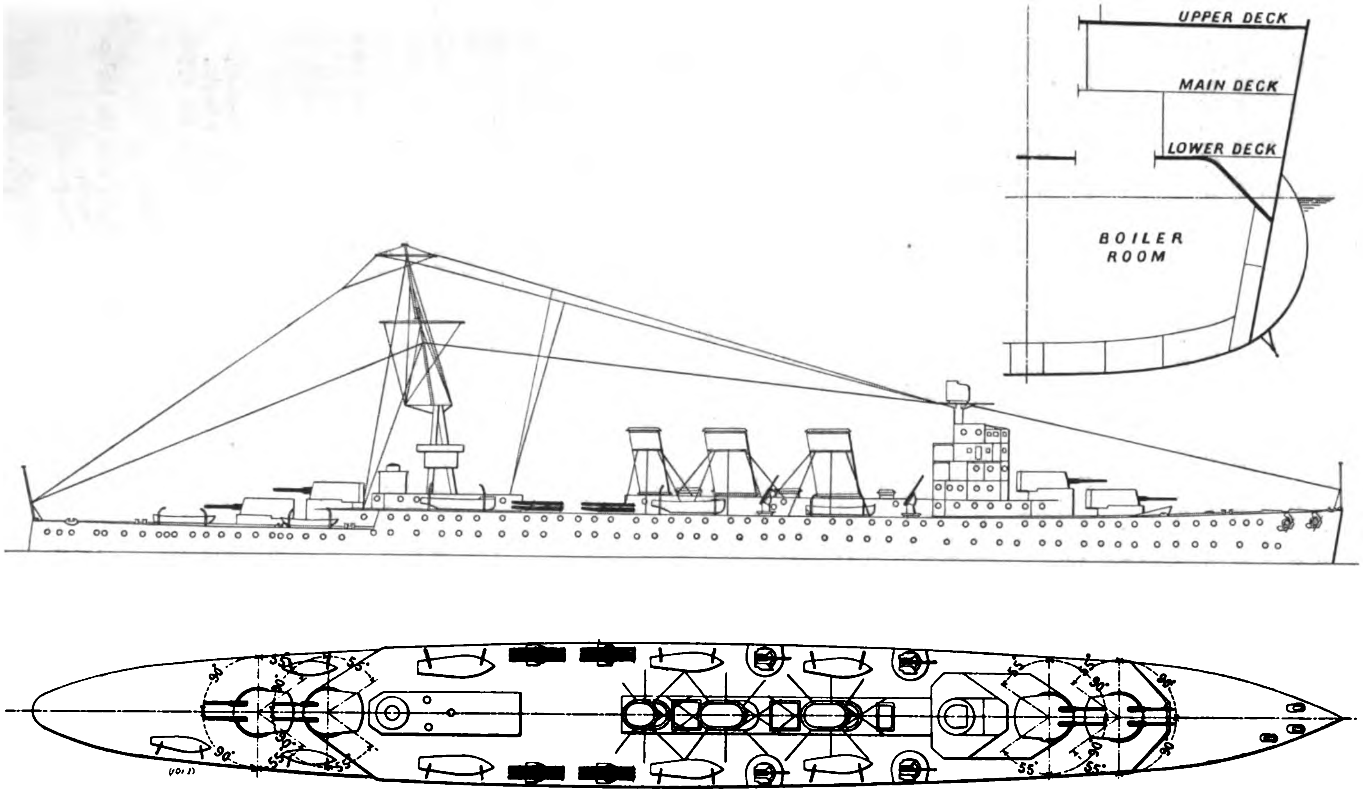
This vessel, subject to being fitted with an up-to-date fire control system, is, in my opinion, one of the most powerful units that could be designed for the purpose in question. The vessel is without a bulge, but is very thoroughly sub-divided above and below water.

As a matter of interest it may be mentioned that if six 8-inch triple mounted guns are considered a sufficiently powerful armament, the removal of one of the triple turrets with its guns and ammunition would allow for an increase of speed from 35 to 36 knots without unduly stressing the machinery and boilers.

It might also be mentioned that by substituting eight 8-inch guns twin mounted in four turrets, together with the requisite ammunition, for the nine 8-inch triple mounted guns in three turrets, the armament weight remains practically unaltered.

## Proposed Design with Twin-Gun Turrets.

The first variation to the basic design, referred to as " B," consists in reducing the speed to 34½ knots and substituting eight 8-inch twin mounted guns, in two turrets forward and two turrets aft, for the nine 8-inch triple mounted guns in three turrets. In this case the arrangement allows of three decks being fitted over the boiler and engine-rooms, one deck being carried down below the waterline, allowing the vertical side armour to be dispensed with entirely.



DESIGN OF LIGHT CRUISER, TYPE "B."

Length, 585 ft.; displacement, 10,000 tons; speed, 34½ knots; armament, eight 8-in., four 4·7 in. h.a., twelve 24-in. torpedo tubes. Protection, 1 in. to 3 in. on barbettes and decks.

This arrangement will appeal to those who are opposed to the placing of three comparatively small calibre guns in one turret, and also to those who believe that all vessels should be protected as far as possible from aircraft attacks and from plunging shot from long range gun-fire. This vessel is fitted with a bulge. The elevation, gun deck, and section of the design are shown on page 69, and an illustration of the vessel at sea is given on the Plate facing page 59. The dimensions and other particulars are as follows :—

| | |
|---|---|
| Length .. .. | 585 feet. |
| Displacement .. | 10,000 tons. |
| Speed .. .. | 34½ knots. |
| Armament .. | Eight 8-inch guns, twin mounted, in four turrets, two forward and two aft.<br>Four 4·7-inch high angle guns, mounted on the upper works.<br>Twelve 24-inch torpedo tubes, triple mounted on the upper deck. |
| Protection .. | Barbette and deck protection 1 inch to 3 inches.<br>The vessel is arranged with a bulge, and has three decks over the boiler and the engine-rooms.<br>No vertical side protection. |

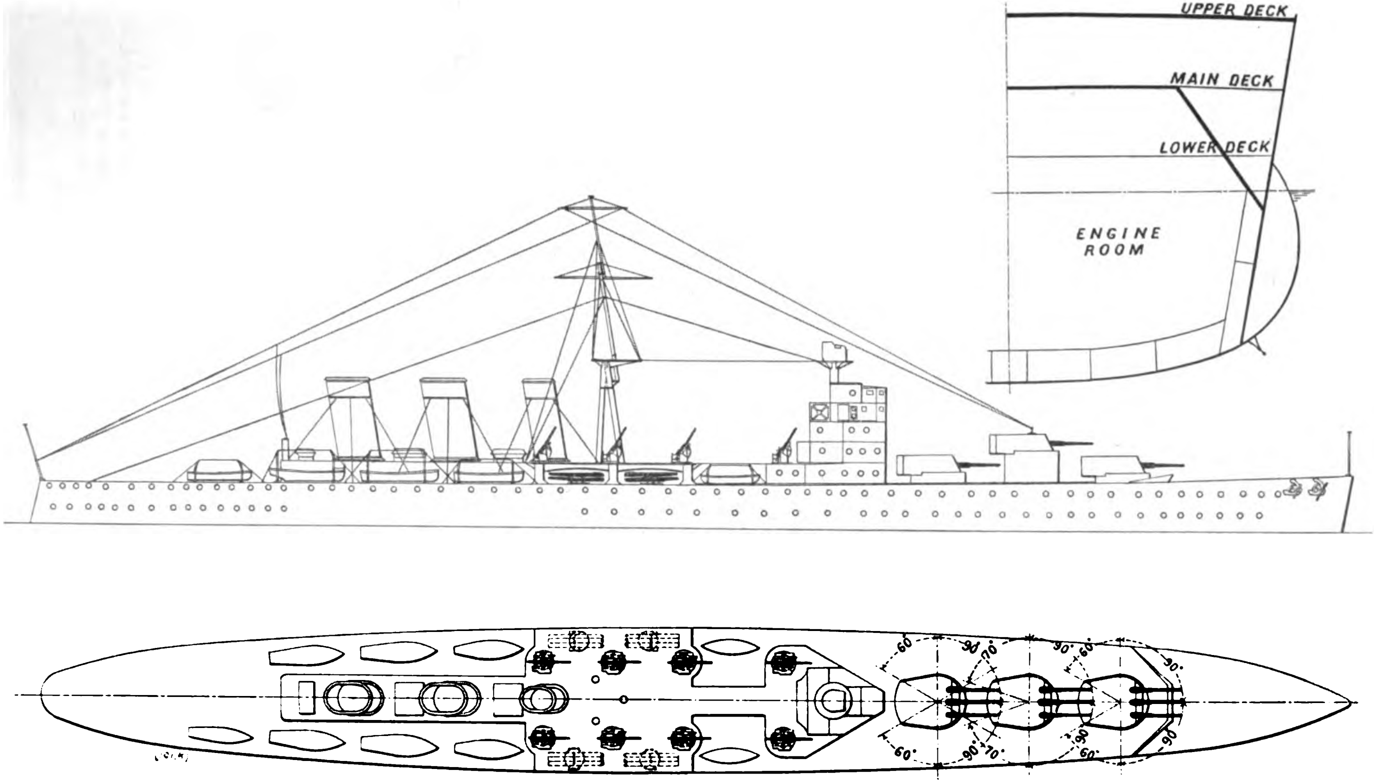
In the foregoing designs "A" and "B" the disposition of the main armament and machinery has been arranged in a manner generally accepted, but it is possible to modify this disposition by placing all the nine 8-inch guns forward and arranging the boiler-rooms aft of the engine-rooms. This, with a reduction of one knot in speed and dispensing entirely with side protection, utilizing the weight saved to give the vessel a maximum of horizontal protection, would produce a fighting ship which, in my opinion, is in some respects a more powerful fighting unit than design "A."

### ANOTHER VARIATION OF THE BASIC DESIGN.

In the variation referred to as "C," the speed is 34 knots, the nine 8-inch guns are fitted forward and the auxiliary armament is increased to eight 4·7-inch high angle guns, whilst the number of torpedo tubes remains the same, namely, twelve. The vessel is arranged with a bulge and has two decks over the boiler-rooms and three decks over the engine-rooms. The elevation, gun deck, and section of the design are shown on page 71, and an illustration of the vessel at sea is given on the Plate facing page 72. The dimensions and other particulars are as follows :—

| | |
|---|---|
| Length .. .. | 570 feet. |
| Displacement .. | 10,000 tons. |
| Speed .. .. | 34 knots. |
| Armament .. | Nine 8-inch guns, triple mounted in three turrets, all forward.<br>Eight 4·7-inch high angle guns mounted on the upper works.<br>Twelve 24-inch torpedo tubes all triple mounted on the upper deck. |
| Protection .. | Barbette and deck protection, 1 inch to 2 inches.<br>No vertical side protection.<br>The vessel is arranged with bulge, has two decks over the boiler-rooms and three decks over the engine-rooms.<br>The boiler-rooms are placed aft of the engine-rooms. |

The only difference between the sections of design "B" and "C" is, as will be seen, that in design "C" the protective deck is shown raised to accommodate the boilers at the after end. In these



Design of Light Cruiser, Type "C."

Length, 570 ft.; displacement, 10,000 tons; speed, 34 knots; armament, nine 8-in., eight 4·7 in. h.a., twelve 24-in. torpedo tubes. Protection, 1 in. to 2 in. on barbettes and deck.

arrangements the protection is disposed in the horizontal direction, the protective deck being from 1 inch to 1½ inches in thickness. Additional protection is obtained from the thicknesses of the side and deck plating required for strength. In arranging these designs the sloping protective deck has been adopted as being more efficient, for with a slight increase of weight it gives the best combination of horizontal and vertical protection to the machinery and magazines.

The foregoing arrangement would tend to simplify the fire control and enable the control positions, together with the anti-aircraft battery, to be kept free from any interference from the funnels. Among other advantages the engine-rooms, being more or less in the fullest part of the vessel, can be provided with better wing protection. The boilers being raised a considerable distance above the keel are not in the direct line of torpedo or mine explosion, and in the event of the bulge and the wing bulkheads being damaged the boilers would not be immediately put out of action through flooding, and the *personnel* would have a better chance of escape. An objection to be raised to this arrangement is that the boilers are more exposed to gun-fire than if placed lower down in the vessel, but in practically all light cruisers the boilers are partly above the waterline and are thus open to the same criticism.

Apart from the advantage gained due to gun control, it has always been difficult to provide satisfactory protection from mines and torpedoes to the after magazines, owing to the fineness of the lines of the vessel. This difficulty is more or less overcome by the disposition of the armament proposed.

### THE FINAL VARIATION OF THE BASIC DESIGN.

The final variation which may be referred to as "D" consists of a 34-knot vessel, all the boiler-rooms being placed aft of the engine-rooms, the principal armament consisting of six 8-inch guns twin mounted, all forward, eight 4·7-inch high angle guns, and twelve 4-inch torpedo tubes. This design is arranged to show the difference occurring if three twin turrets with 8-inch guns were fitted in place of the three triple turrets with 8-inch guns as in design "C." The vessel is arranged with a bulge and, like design "C," has two decks over the boiler-rooms and three decks over the engine-rooms, the lower one being carried down below the waterline; consequently no vertical side protection is fitted. The elevation and gun decks of the design are similar in appearance to design "C," and it is not necessary to give illustrations. The dimensions and other particulars are as follows :—

| | | |
|---|---|---|
| Length .. | .. | 565 feet. |
| Displacement | .. | 10,000 tons. |
| Speed .. | .. | 34 knots. |
| Armament | .. | Six 8-inch guns, twin mounted in three turrets placed forward.<br>Eight 4·7-inch high angle guns mounted on the upper works.<br>Twelve 24-inch torpedo tubes, triple mounted on the upper deck. |
| Protection | .. | Barbette and deck protection, 1 inch to 3 inches.<br>No vertical side armour.<br>This vessel is arranged with bulge, has two decks over boiler-rooms and three decks over the engine-rooms.<br>The boiler-rooms are placed aft of the engine-rooms. |

The section for design " D " conforms generally to design " C," excepting that the considerable saving in weight due to the lighter armament has been applied to protective purposes.

Rear-Admiral W. H. D'Oyley, in the " Annual " for 1923, suggested that two different types of cruiser are required: one for action with the fleet and one for commerce protection. I am inclined to the opinion that it will be more advantageous and economical in the long run to restrict the construction to one type only, such type in the first instance to be capable of acting in conjunction with the battle fleet and, when necessary, to be detached for purposes of commerce protection. I am also forced to the conclusion that the majority of the cruisers in a modern navy will approximate closely to the standard of 10,000 tons displacement, exclusive of fuel, with a main armament of 8-inch guns, varying only in number and disposition; with a formidable torpedo equipment and a powerful anti-aircraft artillery armament, and a minimum of protection.

The restriction in tonnage by the Washington agreement, and the necessity of utilizing every vessel in any main battle, will operate to combine in a single type all the qualities essential in a vessel occupying a place intermediate between the battleship and the destroyer. Such vessel, while capable of keeping outside the range of the guns of an enemy battleship by her high speed, would prove a menace to such battleship by her torpedoes. Even if unable in fine weather to out-distance the speedy destroyers of an enemy, it could annihilate them by powerful gun-fire whilst avoiding their torpedo attack by means of high speed. Such a cruiser also could hold her own against an aerial attack by a combination of highly effective anti-aircraft artillery and by ability to manœuvre under a speed practically equal to the fastest torpedo craft.

GEORGE THURSTON.

# CHAPTER V.

## THE FUTURE OF THE CRUISER: A FRENCH STANDPOINT.

WHAT are the views entertained in France in the matter of cruisers? In what direction may those views be modified in the near future? These two questions are dealt with briefly in the course of this chapter.

The limited programme of new construction voted by the French Parliament in 1922, and now being carried out, included, among other ships, three cruisers, the Duguay-Trouin, La Motte-Picquet, and Primauguet. These three units, classed as "light cruisers," or "squadron scouts," were designed previous to the Washington Conference, with the following ends, as stated in the Report laid before the French Senate:—

(1) To protect destroyers and torpedo-boats against the intervention of enemy scouting ships.
(2) To clear the sea of enemy destroyers and torpedo-boats.
(3) To ensure regular intercourse with the French colonies.

These cruisers are to have a normal displacement of 8,000 tons (9,500 tons with their full load of fuel). Their boilers, eight in number, and turbines are to be sufficient for attaining 100,000 s.h.p.; their speed is reckoned at 34 knots, and their radius of action 4,875 miles at a speed of 15 knots. Their armament is to consist of eight 5·9-inch (15 cm.) guns, four 75 mm. (2·953 inch) anti-aircraft guns, with a number of anti-submarine depth charges and twelve torpedo launching tubes.

In the spring of the year 1924 a second limited programme, or, in other words, a second series of new construction, formed the subject of a Bill placed before the French Parliament. This included other light cruisers. Their characteristic features have not yet been made public, but it has transpired that their displacement is to be 10,000 tons, the maximum prescribed by the Washington Agreement, and their armament is to consist of 8-inch (203 mm.) guns, the maximum calibre fixed by the Agreement. The laying of the keels was to be distributed over four years, down to 1928, so that the last units to be built were to enter the Service at the latest in 1931, a date which corresponds, subject to prolongation, with the end of the truce which is the object of the Washington Agreement.

Up to the present, Parliament has only voted two cruisers—Duquesne and Tourville—which are now under construction. These vessels are 185 m. (607 ft.) in length, and 19 m. (62 ft. 4 ins.) in breadth, while their speed is 33 knots. Their armament consists of eight 203 mm. (8 in.) guns mounted in four double turrets, eight 75 mm. (3 in.) guns, eight 40 mm. (1·6 in.) anti-aircraft guns, and two triple 550 mm. (21·7 in.) torpedo tubes.

### FRANCE'S LIGHT CRUISERS.

As is well known, France now owns in regard to light cruisers, only the five ex-enemy ships Strasbourg (ex-Regensburg), Metz (ex-Koenigsberg), Mulhouse (ex-Stralsund), Colmar (ex-Kolberg), and Thionville (ex-Novara). The latter, launched in 1913, is but a *conducteur d'escadrille*—torpedo-boat squadron leader; her displacement is only 3,400 tons, and her armament consists only of nine 10 cm. (3·937-inch) guns. The others, Strasbourg, Metz, Mulhouse, alone are real cruisers, but are small units (4,500 to 7,000 tons and 26 knots); they are, however, relatively well armed, carrying from six to eight 15 cm. (5·9-inch) guns. The Colmar is already an old ship (1907), and will be of no value in 1931, whilst the three others entered the service in 1911 and 1916.

Therefore, if the building of the second series of new units is approved by Parliament and carried out without modification, France is to have in 1931 3 cruisers of from 6,000 to 7,000 tons and 15 to 20 years old, 3 cruisers of 8,000 tons and 6 years old, and 6 cruisers of 10,000 tons of recent construction, giving a total of 12 light cruisers.

It is impossible at present to consider the future beyond the year 1931. Although the Treaty of Washington is to remain in force until December 31, 1936—according to clause 23—it is also a fact that the contracting Powers will be at liberty to build line-of-battle ships from the year 1932. The year 1931—unless fresh agreements intervene—marks the end of the disarmament truce.

Now, does France require twelve light cruisers? Considering the figure merely as a figure, it is most certainly a low one, so low even that it may appear ridiculous to nations owning a large fleet. What strategical and tactical rôle can the French Navy attribute to units of this class?

According to the French official and parliamentary doctrine, the main duty of these cruisers is to protect the passage of troops from Africa to France by repelling the enemy's destroyers and torpedo boats in their endeavour to hinder these operations, and to prevent at the same time the intervention of enemy cruisers. Such a conception is hardly defendable and calls for the following remarks.

### THE "FREE PASSAGE OF TROOPS."

The French General Headquarters Staff appears to have remained in recent years constantly imbued with this particular thought, *i.e.* "insuring the free passage of troops from Africa to France." There is no doubt that the last war has abundantly proved that such a precaution on the part of France is one which should not be lightly set aside. But, notwithstanding that, is there never to be contemplated another, wider sphere of activity for the French Navy? This is not the place to go further into this question, and I shall leave it without further comment. But even were the General Staff to be followed in this conception, can it be said that twelve light cruisers are able adequately to ensure the transport of troops from Africa?

Reckoning upon surface ships exclusively, success would depend upon an enemy owning no cruisers superior to the French in number and in power, let alone line-of-battle ships. If, further, the other elements of power, submarines, aircraft, be taken into account—and it is most essential to take them into account—how paltry the twelve cruisers appear and how uncertain would be their defence!

It should be remembered that we are dealing with the year 1931. In that year the enemy who wishes to prevent the transport of troops from Africa will have recourse to adequate measures and forces, the latter including submarines, mines, and aircraft.

The defence of troop transports by cruisers is an anachronism. Such means are ten years behind the times. Convoys of this kind will be in danger from subaqueous and aerial torpedoes much more than from gun-fire. In order to protect them large numbers of destroyers and aircraft will be needed; they will have further to be escorted by anti-submarine vessels, and also by submarines, the latter, acting in conjunction with the aircraft, constituting the means with which to fight the surface ships, cruisers and even battleships, dispatched by the enemy to cut off convoys. Were the intention of using cruisers for such a duty, nevertheless, adhered to, the cruisers should be of the submarine type—otherwise they are useless.

## Peace and War Functions.

Quite apart from the very limited range of duty which is planned for them, what service can light cruisers now perform? Probably long-distance cruises, calling at the various colonial possessions, carrying out military missions and making demonstrations. But such a service is peace-time service, for which a few units are sufficient.

It may be asked whether squadron scouting is not a function specially suited to light cruisers? Here again the utilization of surface ships for scouting duty may be considered of doubtful efficacy. The time when frigates scouted for vessels of the line is past. Moreover, how can the French Navy contemplate having ships to scout for a squadron, when the squadron itself is lacking? The Treaty of Washington limits France in the matter of battleships to ten. Of the ten, one, the France, is sunk off Quiberon; three others, the Condorcet, Diderot, and Voltaire, are of no value. The remaining six, the Bretagne, Lorraine, Provence, Paris, Jean-Bart, and Courbet, will be from eighteen to twenty years old at the end of 1931, and will then be of no further value. Will a squadron formed of these ten "antiquities" require any scouts? To ask the question is to answer it.

The General Headquarter Staff of the French Navy, no more than the French Parliament, contemplates the construction of battleships, and the French Delegation to Washington made this clearly understood; the Treaty contains the following clause:—

> **France expressly reserves the right to utilize her tonnage assignment for ships of the line in the manner she finds best, provided the displacement of each individual ship does not exceed 35,000 tons, and the total tonnage of ships of the line remains within the limits established.**

## French Opinion and Battleships.

There is in France a strong current of opinion against battleships; their fragility during the war was frequently evidenced. It is with other arms than these that the country will be able to defend herself and gain the victory. This view is general throughout the land.

Such being the case, and this view is generally prevalent, cruisers can never serve in France as squadron scouting ships; hence the more reason for building a limited number only, for distant cruises, missions to foreign countries, and so forth.

In short, no military rôle can be ascribed in the French Navy to light cruisers. The question of cost also comes in. France is no longer wealthy, and has no cause to build useless ships. A 10,000 ton cruiser costs 100,000,000 francs. For the same sum there can be built ten submarines, and these are greatly to be preferred to the cruiser.

My view having been asked concerning this question of light cruisers, I have given it. Fortunately it also prevails in many French circles. I have set forth the above considerations solely from the French standpoint. They sufficiently reflect the opinion of numerous French naval officers and engineers in favour of ensuring that the six cruisers mentioned in the programme submitted to Parliament be taken as a maximum figure. In all probability, this will be the case. If the figure is modified, in all likelihood it will be reduced.

Briefly and quite frankly, I believe that France can do better than build cruisers. In times gone by, she was a first class naval Power. Coming to more recent times, the continental strain she had to meet during the war, and the difficulties of all kinds she has had to face since the Armistice, have constrained her to neglect her Navy, and more is the pity! She will regain her rank among the naval nations of the world only when she has succeeded in building powerful submarine and aerial fleets. It is only then that she will be in a position to defend herself, for she has never dreamt, and will never dream, of being the aggressor. Logically, there is no room in such a programme for light cruisers.

A. Delpierre

# CHAPTER VI.

## THE STRATEGICAL AND TACTICAL INFLUENCE OF THE NEW LIGHT CRUISER PROGRAMMES OF THE POWERS.

THE primary impulse in the renewal of competitive naval building on a large scale, as manifested by the extensive construction programmes of cruisers and other auxiliary naval tonnage by several of the Powers, is probably a desire to gain in relative aggregate naval strength. Some of these programmes are of such scope and involve such large expenditures of funds as to nullify the fundamental spirit of the Naval Treaty signed at Washington (the spirit of a naval holiday on a basis of the then status quo in total sea power), and to defeat the cardinal object of reducing "the burdens of competition in armament" solemnly declared in the preamble of that treaty.

It is not convincing to invoke the letter of the treaty as a justification of these huge programmes. Omission from the written document of any restriction upon the construction of certain types cannot fairly be construed as ethical freedom to build such large tonnage in those types as to upset the primary principles of the agreement, and to contravene the whole basis of understanding upon which the formulation of the treaty rested.

### COMPETITION AND SUSPICIONS.

The broadest and by far the most important strategical influences of the construction of so many light cruisers, in conjunction with other auxiliary naval vessels, appear to be :—

(*a*) A decided change from the status quo existing at the time of the Washington Conference, in the relative naval strength among the Powers.

(*b*) The restoration of certain international war-provoking suspicions, inseparable from large scale and highly expensive competitive building, which the Washington Conference had done much to allay.

With the advent of actual war, the possession of numerous cruisers is likely to lead to early, widespread activity against and in the protection of merchant shipping. The national need of sea communications is becoming more and more important, not only from the military and naval, but also from the civil and economic standpoints. The usual need of the battleships, together with most of their satellites of other types, remaining strategically concentrated, will normally prevent the fleet as a whole from engaging in extensive measures against commerce. The actual exercise of control of the sea, or attempts to parry such exercise, must of necessity be ordinarily delegated to cruisers, with their high speed, long radius, and moderate power. The tendency towards "cruiser warfare," assuming the scope of a major operation, will be increased by an initial wide separation between the two main fleets, a great disparity of aggregate power between them, and by a multiplicity of cruisers.

## RAIDS ON COMMERCE.

The placing of merchant shipping in convoys, the supply of escorts for them, the formation of cruisers into combat squadrons, either to hunt down enemy raiders or to attack his convoys, and the drawing together of the two main fleets, are all normal developments of the initial situation that will tend to lessen the shipping, as opposed to military-naval, aspects of cruiser operations. Less and less will raids on commerce become easy and profitable. More and more will the cruisers have to serve the purposes of the fleet in gaining information of hostile movements, and in denying the enemy knowledge of what one's own main forces are doing.

Modern fleets are able to move so swiftly and to reach so far that naval scouting has become more than ever essential, and often must be extended over large areas and conducted at great distances from friendly battleships or bases. The scouts should be strong enough not to be easily driven off by inconsiderable hostile screens, and fast enough to escape ready destruction by strong units of the enemy. The modern light cruiser is a good compromise between these two somewhat irreconcilable conditions, and a large number of them in the possession of one fleet will render it difficult for the opponent to conceal his strategy. Conversely numerous cruisers will promote the ability of a fleet to screen its own movements when desired.

Great as such advantages are in the realm of strategy, they may be even greater on the eve of tactical contact. The preludes to Trafalgar, Tsushima, and Jutland all illustrate and emphasize the value of cruisers in facilitating, before the main engagement, manœuvres calculated to gain very important opening advantages of tactical position.

## THE INFLUENCE OF AIR POWER.

It is true that the advent of air power greatly affects the utility and employment of cruisers in scouting and screening operations, both strategical and tactical. But the underlying principles remain the same, and since cruisers themselves will doubtless carry planes and certainly give essential support to aircraft carriers, they will represent not only surface power but also air power.

The existence of a great number of cruisers will thus tend to magnify the complexity and importance of those phases of naval warfare, strategical and tactical, which precede engagement between the two battleship forces, with their satellites of destroyers and other combat auxiliaries. Great sea battles of the future seem likely to be introduced by cruiser actions of considerable magnitude, which will have an important bearing upon the final decision.

Will numerous cruisers exercise any weighty influence upon the course of the major battle itself? The answer is undoubtedly in the affirmative, especially because of the great value of massed destroyer operations, and their need of cruiser support. The two greatest elements of fleet power are the guns of the battleships and the torpedoes of the destroyers. These must both be brought to bear against the enemy, virtually simultaneously, if the basic principle of tactics is to be complied with. The admiral who uses only his battleships against hostile battleships wastes half his aggregate strength. The admiral who brings his massed destroyer attack into conjunction with his battleship attack follows the great victory-getting principle of concentration.

## The Destroyer and the Submarine.

We need only recall the various incidents during the battle-cruiser and battleship phases of Jutland, when destroyers were brought into play, to appreciate the value of destroyer attacks which get home against capital ships engaged with their own types, and the ease with which unsupported destroyer attacks can be stopped by cruisers. The tremendous power represented by a large force of destroyers may easily counterbalance many battleships, but must have the aid of cruisers if it is to be properly utilized.

These underlying conditions call for the employment of the principal destroyer forces in the main daylight battle, rather than during the night before or after, and the tendency so to use them will become greater when cruiser strength of sufficient speed is available as support.

In much the same way a multiplicity of cruisers will incline towards the utilization of submarines in fleet action. For such work the underwater craft require a vessel to escort them on the surface to an advantageous position; and to keep them informed, both before and after submerging, of the general course of the action, in order that there shall be no mistakes as to which fleet is attacked. Friendly forces may also need warning of the nationality of the submarines in question. These escort functions can be properly performed only by a vessel of the strength, speed, and other qualities of a cruiser.

Finally, it is to be observed that the utilization of air power in naval battle will largely depend upon cruiser support. Aircraft carriers must necessarily operate at a distance from engaged battleships, and are inherently weak against the attack of hostile cruisers, destroyers, and other vessels. When sufficient cruisers are available to give a strong measure of security to the carriers, air power can be employed with greater certainty and effectiveness in fleet actions.

It is thus seen how indispensable cruisers are to the successful utilization of auxiliary naval strength—air power, submarine power, and destroyer power—in conjunction with the battleships and with each other during sea battles. It is then that cruisers play the part of a tactical cement to bind the entire fleet together into one unified co-ordinate whole. The principal tactical influence of a large number of cruisers is, therefore, to magnify the importance of, and to lead to the greater employment of, auxiliary sea power in fleet action.

During the borderland stages between tactics and strategy, and in the realm of purely strategical warfare, it has been shown that the function of cruisers is again that of a fleet " binder "—through the gaining and transmission of information, without which the Commander-in-Chief cannot operate his fleet as a whole, in contravention of enemy movements. Numerous cruisers will tend to place these preliminaries to the major combat upon a more scientific basis. We have also seen how the large new cruiser programmes will tend towards great activity against merchant shipping in the initial stages of war.

Finally, attention should again be called to the great alteration in aggregate naval strength among the Powers which these programmes are fast bringing about. They will soon make a mockery of the Washington Conference, not only by effectually destroying the agreed upon ratio of naval strength, but also by restoring highly expensive competitive building. Whatever gain may have been made by the Washington Conference towards alleviating the burdens of armaments and allaying war-provoking international suspicions, is being rapidly lost through the great programmes of cruiser construction. This is by far the most important of all the numerous influences which the programmes will have.

DUDLEY W. KNOX.

# CHAPTER VII.

## THE NAVY AND ITS FLEET AIR ARM.

THE dissatisfaction of the Navy with the present organization and control of its aerial arm has been apparent to the public generally for some years past. Public discussions and parliamentary questions have shown the concern with which the position is viewed by those with knowledge of the subject. Uneasiness has no doubt been allayed by the working arrangement reached between the Admiralty and the Air Ministry in agreeing to the decision of His Majesty's Government to give a trial to the recommendations of the National Defence Committee. Nevertheless anxiety still exists, since it is not clear that the compromise arrived at can overcome the inherent defects of a system involving dual control and responsibility for the efficiency of the fleet. How can that efficiency be effectively maintained, it is asked, when there exists within the Navy a service separate from the Navy, a service with different conceptions and different traditions, a service looking to an authority independent of the Admiralty for its upkeep and preferment ?

### THE FUNDAMENTAL ERROR.

The system now being tried is the result of the adoption by His Majesty's Government of the report of the National and Imperial Defence Committee and the special Sub-Committee which consisted of Lord Balfour, in the Chair, Lord Weir and Lord Peel. Owing to the unfortunate illness of Lord Balfour precluding him from attending a majority of the meetings, from visiting establishments, or from personally questioning and hearing the evidence of witnesses, the report may virtually be looked upon as the work of Lord Weir and Lord Peel. The report itself was presented to Parliament on the last day of the Summer Session, 1923, and no opportunity therefore occurred at the time in the House of Commons for criticism and discussion. It was generally felt that the report itself was in the nature of a feeble compromise which tinkered only with details. It made no attempt to remedy the fundamental error in the existing system, namely that an arm of the fleet—the Fleet Air Arm—is largely manned, administered, trained and controlled by an authority other than the Admiralty, and that thereby dual responsibility for the efficiency of the fleet replaces the single responsibility of the Admiralty.

The Press as a whole called attention to this aspect of the matter, and in the little time available before Parliament adjourned it was made clear that the report could not be accepted as in any way a final judgment on the question. In fact the Prime Minister in announcing the decision of His Majesty's Government promised that the whole of the facts should be placed before the House when it met in the autumn, in order to allow of the opportunity to challenge the decision by a motion. Owing to the changed political situation the opportunity for that challenge did not occur.

Meanwhile, as a result of the efforts of Lord Haldane, who was instructed by the present Government to endeavour to reach agreement between the Admiralty and the Air Ministry as to the interpretation of the report of the Sub-Committee, arrangements have apparently been arrived at for putting into force that report, and for safeguarding so far as is possible within the limits of the report the responsibility of the Admiralty for fleet efficiency.

The precise effect of the agreement is not fully known, but so far as can be gathered from what has appeared in the press the number of naval officers in the fleet air arm will be considerably increased, the arm will be provided out of Admiralty votes, there will be Admiralty representation at the Air Ministry, and there will be a greater degree of control by the Admiralty both as regards the *personnel* and the provision of material.

All this is to the good, and it is certain that every effort will be made to make the agreement a working success. Peace conditions may permit of this. But dual responsibility, though possibly to a less extent than formerly, still exists, and whilst this dual responsibility exists it is contended that war requirements are not met.

A change will only finally be brought about when it is recognized generally that fleet efficiency suffers. It is desirable, therefore, if the public judgment in this respect is to be exercised to effect, that the relation between fleet efficiency and the control of the Fleet Air Arm should be examined and understood, a clear opinion being then arrived at as to the acceptance or not of the contention that the present system is unsound and dangerous.

## Battle the Decisive Factor.

Let us first examine briefly certain fundamental principles with the object of ascertaining if the present system fulfils the requirements of such principles. The Navy exists to destroy by battle, or failing destruction to neutralize by the threat of battle, the naval forces of the enemy. It is the existence of opposing naval forces which justifies the upkeep of the Navy. Battle with those opposing forces is the object sought by the Navy. Battle, therefore, is the decisive factor and is the supreme object for which the Navy is trained.

A modern fleet consists of various arms, each charged in the strategical and tactical plan with its particular function. Thus we have the light cruiser arm, the destroyer arm, the submarine arm, the battleship arm, and now, in modern naval warfare, we have added the air arm. In fact, a fleet consists of various arms working on the surface, above the surface, and below the surface.

We have seen that battle is the decisive factor for which the fleet is trained. In the supreme fleet battle success will depend upon the maximum power being developed rapidly and smoothly by the work of all arms. To obtain this maximum power the naval view is that all arms require to be trained under a common doctrine, directed by a single command and manned by an officer *personnel* with general naval strategical and tactical knowledge. Only thus, it is claimed, can perfect strategical and tactical co-ordination be achieved.

This briefly is the doctrine of unity, unity of thought, unity of direction.

### A Dangerous Doctrine.

The alternative to this doctrine of unity is that of separation but co-operation. It is this latter system on which the Fleet Air Arm is organized to-day. It is claimed that the Fleet Air Arm is an integral part of the Air Force, not of the Navy, that its officer *personnel* are air officers under the Air Ministry, not naval officers under the Admiralty, and that its training is primarily their responsibility, only touching the Admiralty when embarked on board the carriers.

The recommendations of the National Defence Committee it is true make arrangements for the Fleet Air Arm to be manned up to 70 per cent. by naval officers, but these very naval officers during their service in the Fleet Air Arm are to be attached for this purpose to the Air Force and trained at Air Force schools, emphasizing in fact the distinctive position of the Fleet Air Arm as an arm apart. It is as a co-operating force rather than as an arm of the Navy that it differs from all other arms of the Fleet such as the submarine arm, the destroyer arm.

The question, therefore, with which we are confronted stands thus: In the various steps, administrative, training, operational, on which naval fighting efficiency in the supreme naval battle depend, is complete absolute single control and responsibility under the Admiralty the surest road to success, or is dual control as between the Admiralty and the Air Ministry, relying on understanding and co-operation, a more certain method?

In this connection it is pertinent to remark on the disadvantages which war experience has shown us are attendant on "co-operation." We have indeed been warned by the late Field Marshal Sir Henry Wilson that "the difference between co-operation and command is the difference between the loss and the winning of war." If this remark applies to the land battle, how much more does it apply to the sea battle.

In the former, whilst the Commander-in-Chief controls the plan of operations and the operations subsequent to battle, he exercises little actual control over the tactical movements concerned with the battle itself.

On the other hand, in the naval battle which takes place in a comparatively small moving area, under conditions in which time is an all important factor, whilst initiative on the part of subordinate leaders is essential and is encouraged, to develop the maximum power of the Fleet as a whole in the shortest possible time calls for a large degree of personal control by the Commander-in-Chief himself from his position in the main battle line.

How can he exercise that control with confidence, it may be asked, if a vital arm of the fleet under his command is organized and trained on lines apart from the Navy, and is partially manned by a *personnel* without the sea sense and the sea understanding? And do not these basic principles necessitate, if we are to ensure maximum fighting efficiency at the critical moment, namely, when the hostile fleets are engaged in action, that the Admiralty should exercise full and complete responsibility for the raising and training of every arm of the Fleet, including the Fleet Air Arm?

## OUR SEA DEPENDENCE.

But it may be held in defence of the present system that fleet efficiency is not an end in itself, that it is only part of the whole, and that in investigating this question consideration should be given to the attainment of general military efficiency rather than to efficiency in a particular part of the system.

It is argued by this school of thought that fleet efficiency if it is achieved at the expense of air efficiency, becomes a matter for compromise, and the best organization from a purely naval point of view should be modified to meet the requirements of general home defence.

But can this argument be maintained in the face of what we believe are accepted propositions, namely, that—

1. The people of Great Britain depend for their existence as regards essential foodstuffs and supplies on overseas trade.
2. This overseas trade depends now for its safety, and will depend in the future so far as it is possible to forecast, on the ability of our naval forces to defeat in battle any enemy naval forces which threaten that trade.

The proof of these propositions will not be undertaken within the limited space at our disposal. They are the subject of general agreement, and they lie, as has been admitted by the Committee of Imperial Defence, at the root of the subject of Imperial Defence. From them it follows that the ability of the people of Great Britain to exist in war, depends on the ability of the Navy to defeat in battle the opposing Navy. Our very life depends on naval fighting efficiency and makes that efficiency a matter on which it is not possible to compromise.

But it may be contended, whilst accepting this reasoning, that, nevertheless, there is another intense peril which we require to keep constantly in mind, namely, the complete stoppage of our national life through a moral attack on the nerve centres of the country, and on the civilian population. By continuous and heavy air raids on London and other cities, on our dockyards, railways and munition works, on the coalfields, electrical, gas and water power stations, it is claimed our defeat can be accomplished without the opposing navies or armies ever gaining contact with each other.

Naval officers are not impressed with this argument, which has so constantly been put forward in the past on the introduction of new weapons, and has been as constantly disproved. They are in agreement with the late Sir Cyprian Bridge who, in writing on the question of "Victory by moral effect," said: "Opposed to this attitude is the very general conviction of mankind, based on the records of nearly thirty centuries of belligerent procedure, that victory in war can be gained only by fighting for it, in or on whatever element hostilities may be conducted." And our doubts as to the extent of the actual peril from the air are further increased by the reflection that this attack on the moral of the nation, on defenceless towns, women and children, opposed as it is to the Washington Treaty and to the sentiments of the age, is likely to re-act disastrously on the nation attempting it, precisely as the submarine campaign on merchant vessels acted finally so disastrously for Germany.

## The Naval and Air Perils.

In spite of the foregoing considerations, however, let us accept that this air peril is one of the first magnitude, one to guard against which is vital to our existence. It follows that powerful air forces must be provided to attack the enemy. But acceptance of the air peril in no way modifies the gravity of the naval peril—that is, that the defeat of the British Fleet would inevitably mean the starvation of these islands, including moreover the complete inability of our Air Force itself to operate owing to the stoppage of essential supplies.

The two perils are separate and distinct. The forces engaged in warding off the one cannot be considered as available for assistance in combating the other, since the sea battle may be coincident with the maximum intensity of the air attack, and, moreover, may occur many hundreds of miles from the shores of Great Britain. If, therefore, the magnitude of the air menace to these islands be granted, it involves the creation of strong air forces separate and distinct from the Fleet Air Arm, whose function is to fight with the main Fleet in the sea battle.

It should be noted in passing that because, from the nature of their functions, the Air Arm of the Fleet is a separate entity to the General Defence Air Forces, this does not in any way preclude the idea of naval air forces being utilized if required and if available to assist in the air battle. Just as local naval forces in a great war may be available to assist the army ashore by the supply of *personnel* and material, so local naval air forces may be available to assist the main air force.

What is fundamental, however, is that just as main naval forces which counter enemy main naval forces cannot normally be drawn upon to assist the army until the enemy naval forces have been defeated in battle, so the main naval air forces are not available to assist the Air Force until the defeat of the enemy naval forces.

## AN ESSENTIAL FACTOR IN NAVAL DEFENCE.

We therefore conclude that the Fleet Air Arm cannot be considered as something apart from the Fleet, or as belonging to the Main Air Force.

On the contrary it is a part of the Fleet and therefore should be organized to work with the Fleet on principles precisely similar to those adopted in the case of every other arm, such as submarines. It should be trained to work with other arms at sea, to understand their functions, and thereby to appreciate how best to act in any given situation. To sum up, its organization should be naval; its maintenance and efficiency should be the sole concern of the Admiralty.

But it may be urged that the Fleet Air Arm must play an important part in the sea battle, that during that battle it must be subject to the single operational control of the naval Commander-in-Chief, and that when serving afloat in peace time the Fleet Air Arm should be trained under the Commander-in-Chief. But is this to admit also that the Fleet Air Arm should be manned by a naval *personnel*, and that its training prior to being embarked should be carried out by the Admiralty? On the contrary, it will be argued, whilst insisting that single operational control when afloat and in battle is vested in the Admiralty and Commander-in-Chief, nevertheless, air work, whether afloat or ashore, is subject to similar strategical and tactical requirements, whilst airmen and not seamen are required for this work, whether the operations be over the sea or over the land. Maximum efficiency will consequently be obtained by placing the responsibility for providing, and the general administration and training of, the Fleet Air Arm under the supreme air authority responsible for general air efficiency, the arm only coming under the direction of the Admiralty for actual operations afloat.

## STRATEGY AND TACTICS.

The argument in the foregoing depends for its conclusiveness on the assumption that air work, whether afloat or ashore, is subject to the same general strategic and tactical requirements. It is suggested that such an argument is fallacious, that on the contrary air work in connection with Fleet operations, in its strategical and tactical aspect, is of a specialized nature not common to other military air operations, and that therefore the conclusion that such air work should be divorced from the Navy is one which cannot be maintained.

What are the strategical duties of the Fleet Air Arm, considering strategy in this connection as including the duties prior to the main forces gaining contact with each other? Certainly one of the primary duties in this phase is reconnaissance—to act as the eyes of the Commander-in-Chief, to search out the strategical area for the enemy, and to give early intelligence to the Commander-in-Chief by reporting enemy forces when found, stating as accurately as circumstances may permit their position, composition, and disposition.

To give some idea of the specialized naval nature of this work, and the necessity for its being carried out by officers and ratings of the highest experience trained in the naval schools, let us consider for a moment the experience gained in the late war in regard to reconnaissance work performed by the light cruisers, which are the surface vessels engaged primarily in this duty, and which in future naval actions will act with aircraft of the Fleet Air Arm for this purpose. It was ascertained at an early stage that the finding and reporting of the enemy was a complex matter; it called for a high degree of naval experience, an understanding of the Commander-in-Chief's requirements, and, further, a technical knowledge of wireless telegraphy limitations. It involved also a decision based on the naval situation as to what should or what should not be reported. To reach a correct balance between these conflicting requirements called for naval judgment and training of a high order.

Further, there was an important technical consideration, the enemy having been found, of reporting the features of his disposition. What course was the enemy steering, what number of destroyers were accompanying the Fleet, could the movements of any submarines be detected? Accurate answers to each of these questions were required by the Commander-in-Chief to develop the plan of operations. Again this technical requirement necessitated naval knowledge and naval experience and naval training. And lastly, there was the question of accurately reporting the position of the enemy when that enemy had been discovered.

## IMPORTANCE OF NAVAL EXPERIENCE.

Every one of the foregoing requirements are the requirements of the units of the Fleet Air Arm engaged on reconnaissance. They require naval strategical knowledge, naval tactical knowledge, naval technical knowledge, naval experience. On their efficient performance the whole success of the plan of operations may hinge, and it is to jeopardize such success if the *personnel* for that work are not trained in the naval service and are not naval officers completely and at all times under the Admiralty.

It may be urged, in reply to the foregoing, that the importance of reconnaissance may also be granted, that the argument that naval *personnel* should be employed on this work is appreciated, and, in fact, it is allowed for at present in that there are a certain number of naval officer "observers," and that, by the 13th recommendation of the Sub-Committee of the Committee of National and Imperial Defence, it is suggested that fleet reconnaissance as well as naval spotting should be entrusted to naval officers seconded or otherwise.

This is certainly an improvement on a system which resulted in officers of the Royal Air Force without naval training or experience being placed in the position of observers to the Commander-in-Chief. But we are still confronted with the arrangement by which naval officers are to be attached to the Royal Air Force during their service in the Fleet Air Arm, and are to be trained by Air Force officers in Air Force schools *on shore* to carry out naval reconnaissance work *afloat.* To justify such a procedure was certainly not attempted by the Committee which recommended it, nor by the Government which accepted it. And it is further to be noted that the position is steadily becoming worse rather than better. Hitherto in the Royal Air Force there have been a certain number of senior officers who were originally in the Naval Service and joined the Air Service when that service was given an independent status. However brilliant these officers may have been, the passing of the years since they left the Navy has inevitably put them out of touch with the sea and the progress in naval science, and we are reaching a state of affairs when the naval training of naval air officers at the Air Schools under the Air Ministry is supervised and directed by an organization lacking both naval knowledge and naval experience.

## Tactical Considerations.

The reasons have been set out for considering that in the sphere of strategy in which reconnaissance work is a primary rôle of naval aircraft the duties involved are of a naval nature, demanding for their efficient performance the training and experience of a naval *personnel.* Does a similar conclusion apply in the sphere of tactics when the opposing fleets have engaged in battle and the issue of victory or defeat hangs in the balance ? That tactical issue in the naval battle is finally determined by the gun, with which weapon the capital ships concentrate the maximum power in the minimum time, and it is the tactical aim of each Commander-in-Chief to achieve the annihilation of the other by ultimately bringing to bear the power of his gun batteries in decisive force. Thus a weaker fleet by retiring tactics, torpedo and bombing attacks may endeavour gradually to reduce the efficient units of the stronger fleet. The torpedo, bomb and other weapons all play their part in this phase. But the final object is to achieve a situation whereby the former stronger fleet can be turned upon and destroyed by the gun.

Similarly the stronger enemy may find itself in the initial stages prevented by the retiring tactics of the enemy in bringing to bear gun power. Tactics may have to be directed to frustrate the retiring tactics and force the enemy either to stand up to the gun duel or abandon his disabled units in flight.

## The Gun Duel.

The primary tactical aim, therefore, is to obtain the gun duel under the most advantageous conditions. And in this tactical aim, both in reaching the conditions which will make the gun duel possible, and in ensuring that the gun duel itself will be carried out to the greatest advantage to the Commander-in-Chief, the Fleet Air Arm is given an important rôle. Does not the fact that the Fleet Air Arm carries out definite tactical functions in the naval battle, and that success in that battle depends in combination with other arms on their efficient performance, imply that the Fleet Air Arm is an integral part of the Fleet? And is it efficient or reasonable, therefore, that these naval units should be manned, administered and trained to a large degree by an authority other than the Admiralty?

It may be raised in objection to this line of thought that although the duties of these aircraft contribute so greatly to the success of the naval tactical plan, nevertheless their duties are air duties common to all forms of Air Service, whether carried out with the Army, Navy, or Air Force, and that the duties cannot be considered as specialized naval duties. This line of argument, it is suggested, misconceives the nature of the duties. Every problem confronting the pilots and observers of the Fleet Air Arm in their attempt to bring about the gun duel primarily depends for its solution on the naval tactical situation and can only be adequately answered by a thorough appreciation and understanding of tactical methods. Differing from land operations in which the airman is dealing with a comparatively stationary phase, the naval airman has to develop his attack on, or to furnish reports of, objects which themselves are moving, and are endowed with high manœuvring capability. Is it not under these circumstances to jeopardize the success of the whole naval operations that the Fleet Air Arm should be partly manned, administered and trained under an authority whose responsibility is not concerned with victory in the naval battle?

### Lesson of the Battle of Jutland.

Let us turn to the important duties carried out when the gun action is achieved, when the stronger force is endeavouring to keep the weaker force engaged, and when the weaker force is trying to escape by the intervention of smoke screens and the turning away manœuvre. The solution of the problem of keeping the enemy engaged under such circumstances presented great difficulty in the war. How difficult may be judged from the expressed opinions of Admiral of the Fleet Viscount Jellicoe, and that the solution was not forthcoming up to the middle of 1916 may be judged from the escape of the German High Sea Fleet at the Battle of Jutland. It is to spotting aircraft, that the Commander-in-Chief in the future will depend for assistance.

In the work of spotting, sea experience of a high order is required to distinguish targets, to report directly, to deal with the complicated problem of fleets moving at high speed. In fact spotting in the naval battle is strictly a naval gunnery problem, not an air problem, and as such should be carried out by naval officers trained under the sole direction of the Admiralty.

### Application of Principles.

The question of fundamental principles underlying the organization of the Fleet Air Arm, and the further question of the application of those principles in the spheres of naval strategy and tactics have now been considered. Such consideration has demonstrated the essential naval duties of the Fleet Air Arm, that the primary duties are naval air duties, and that the efficient performance of those duties depends primarily on naval knowledge, on which must be superimposed specialist air knowledge in the same manner that now specialist submarine knowledge is superimposed on naval knowledge in the submarine arm of the Naval Service. As a consequence of this, it may be suggested that the inefficiency of a system which separates the organization of this essentially naval arm from the organization of the remainder of the Naval Service, and which introduces dual control and responsibility for the manning, and training of this arm, as opposed to single control by the Admiralty and naval authority, is unsound.

## Development and Supply.

Turning from the consideration of strategy and tactics to the spheres of development and supply, let us briefly inquire as to whether or not the present system is one which may be expected to ensure maximum naval air development. Quoting from the Report of the National Defence Committee, " under the present system, new design, experimental and research work to meet naval requirements are carried out by the Air Ministry after consultation with the Admiralty, the Admiralty putting forward suggestions as to types required, thereafter the Air Ministry assuming complete responsibility. The Navy are not directly represented on the design, experimental, or research branches at the Air Ministry, but the Air Ministry utilize the services of a certain number of ex-naval officers who have transferred to the Air Force."

The essential feature of this system is the complete absence of any responsibility of the Admiralty for design and development in types of craft which are to play their part in the naval battle. The Admiralty are in a position to suggest, but the power of useful suggestion under a system which separates consideration of the Air from the purview of the Admiralty is strictly limited. At no stage are the Admiralty charged with any responsibility in regard to criticism of design or inspection during and after manufacture of the machines, whose functions are naval.

## Different Types of Aircraft.

It may be argued that aircraft, whether for general or sea operations, are similar, and that under the Admiralty naval air requirements could not be met so efficiently as under a department which specializes on air development and on air research work. It is to be observed, however, in this connection that aircraft for use for naval purposes differ in many essential respects from aircraft used for military operations, that spotting, reconnaissance, and torpedo machines are types peculiar to the Navy, and that the development of these types to meet sea conditions, including their housing on board aircraft carriers, cruisers, and capital ships is largely a naval problem in which sea knowledge and sea experience are necessary. Nor is it suggested that, in this respect, there should be complete separation in the sphere of design between the Admiralty and the Air Ministry; on the contrary, the experience of the Air Ministry as the authority primarily concerned with general air progress, military and civil, must be made the utmost use of for naval air work. But what is required is adequately to guard the responsibility of the Admiralty, that is to ensure that the Admiralty is represented in the design department, and to ensure that the Admiralty officers so appointed are in a position to assume responsibility direct to the Admiralty for designs carried out to the requirements of the Naval Staff. This is not allowed for under the present organization, nor in the proposals of the Committee of National Defence are any suitable arrangements made. It is true that in those proposals there is reference to an exchange of officers between the Admiralty and Air Ministry, with a view to the diffusion of naval and air knowledge in both departments; but the question of responsibility in connection with design is not mentioned.

Nor is the essential point of Admiralty inspection given any consideration in the report. The importance of this matter can be readily understood to the naval service which employs these machines in the naval battle, and therefore cannot permit without anxiety the inspection during production being in the hands of another service.

In considering this question further it must be realized that the objections to the present division of responsibility in the sphere of design are likely to increase in gravity with progress in fleet air work. With that progress naval air design is likely to depart more radically than hitherto from general air design, and this applies particularly in regard to flying boats, the development of which may affect so profoundly the composition of the future Navy. And it is in the development of flying boats that naval and seamanship knowledge in addition to air knowledge is so important.

## NAVAL RESPONSIBILITY AND SUPPLY.

Turning to the question of supply, here again we are not dealing for the purposes of the Fleet Air Arm with the same type of machine as that which is used for general military purposes. Whilst there is no "operational" objection to a common source of supply provided, as in the case of design, naval responsibility in regard to inspection is adequately safeguarded, it is doubtful if any advantage will result. The arguments which obtained in the case of "common design" in order to make use of the central organization in the Air Ministry do not apply in the case of supply. As in the case of naval guns which are supplied to the Navy through the Admiralty organization, so in the case of aircraft for the Fleet Air Arm, it will probably be found more efficient and economical to depend on the Admiralty organization, which is in the closest touch with the requirements of the naval service. It may be argued that under such an organization there is liable in times of emergency to be competition for supply between the different departments. As a result, however, of the recommendations of Parliamentary Committees, which considered the experience gained in war in regard to the supply of articles in which departmental competition was liable to exist, this danger has been largely safeguarded against, and there is no reason to suppose that the organization now in force in this connection cannot also adequately deal with the supply of naval aircraft in the future leaving such supply in the hands of the Admiralty.

This concludes our investigation of the organization of the Fleet Air Arm so far as Design and Supply is concerned. It is held that in these spheres the present organization does not meet requirements, and that provision is not made for the exercise of Admiralty responsibility.

## EVILS OF DUAL CONTROL.

But it is on the operational side that the chief danger of the present organization lies. On that side which governs naval fighting efficiency the evils of dual control are most apparent. In regard to this it has been stated that at the present moment under the existing system the Admiralty have full operational control, and that consequently there is no force in the contention that the system should be altered. But such a statement misconceives the meaning of " operational control." It is true that air units when embarked on board H.M. ships come under the Naval Discipline Act, are subject to the full authority of the captain of the ship, and are required to carry out exactly the operations which may be directed by the Naval Commander-in-Chief, and that further the Commander-in-Chief gives orders as to the number and type of machines to be embarked for the particular operation. But more than this is required. Operational control necessitates control in the sphere of training, on the efficiency of which finally rests the ability successfully to carry out the operation. And further it necessitates control in the sphere of appointment to ensure that the men most suited to the particular naval air work required are in the position where their work will be most valuable.

In regard to all shore training and all appointments, it is the Air Ministry and not the Admiralty who are primarily responsible. Whilst to the Admiralty is left control of the actual carrying out of any particular operation, to the Air Ministry is left control of the means which largely govern success in performance. This is dual operational control in a pernicious form.

## PROBLEMS OF TRAINING.

Considering the question of the training of the Fleet Air Arm in somewhat greater detail, it is agreed so far as " pure flying " is concerned that this is an art common to all flying, naval, army, air or civil, and that as such there is no objection to a common system of training in centralized schools under the Air Ministry. It may be further agreed that as regards actual fighting aircraft against aircraft, this art is also common to all military services, and that training in centralized schools under the Air Ministry is desirable in the interests of efficiency and economy.

But so far as the Navy is concerned, the common degree of air training ceases here. After general and fighting training all naval air training is of a specialized naval nature, designed to meet the requirements of naval strategy and naval tactics. Such training finds no common ground with other forms of air training necessary for airmen working with the other services.

It is carried out in a great measure at schools ashore, just as naval gunnery and naval torpedo training is undertaken at shore establishments at Portsmouth, Plymouth, and Chatham. On its conduct depends the efficiency of the Fleet Air Arm, and through the Fleet Air Arm the efficiency of the Fleet itself. And responsibility for this specialized naval training is, under the present system, vested with the Air Ministry.

## CONCLUSION.

The conclusion therefore reached is that the present organization of the Fleet Air Arm which still leaves a separate service within another service; which still permits a division of responsibility between two authorities, the one naval, the other air, for what it is claimed is essentially naval work; such an organization cannot be considered satisfactory, or designed to meet the requirements of war.

The putting into force of the recommendations of the National Defence Committee may effect an improvement; a larger number of naval officers will receive air training; there will be a greater spread of air knowledge in the Navy generally; a closer liaison may be created between the Admiralty and the Air Ministry.

But dual control will still remain. And it is this dual control which it is believed, for the reasons given in the foregoing, is the fatal defect in the system. Under peace conditions, with goodwill and co-operation, the system devised by the National Defence Committee may possibly be made to work. But will that system adequately meet war conditions? Will it ensure maximum naval power in actual battle? Will it permit naval operations to be carried out with smoothness and certainty?

These are the questions to which public judgment should be directed, for on the Navy finally depends the security of the Empire as a whole, and the maintenance of essential trade, including those food supplies without which the people here at home must inevitably starve.

* * * *

# CHAPTER VIII.

## AMERICAN NAVAL POLICY.

IT would seem like begging the question to say that American naval policy is one which corresponds to, or is demanded by, America's foreign policy, yet the naval policy of every seafaring country in the world should be one which supports and furthers its national foreign policy by means of a sufficient naval force, made up, as to *matériel*, of such types of ships as are required by the country's special circumstances. This implies, in the main, a well-balanced navy, created and sustained by a continuous or annual building programme with the provision of requisite funds.

There are, however, in all countries, three main causes which interfere with the continuity of plans and which unbalance the building programmes; viz. (*a*) irregular and reduced allotments of funds, leading to the building of only such special types as are most urgently needed; (*b*) the building programmes of certain other countries provoke competition as to types superior or similar to those which they are building; and (*c*) continual advances in the application of science to warfare produce new weapons and improvements which take money away from the contemplated allotments for recognized types. A good example of (*a*) is France, which is doing its best with cruisers, destroyers, and submarines, having to renounce the construction of battleships as too expensive. Good examples of (*b*) are the Dreadnought and the battle-cruiser in the past, and the flotilla leader and light cruiser in the present. Good examples of (*c*) are aviation, submarine detection, improved mines, star shells, poison gases, etc. Added to all these disturbances, the Washington Conference has profoundly affected, not only the naval policies of all countries and their building programmes, but, also, in many cases, the actual design of certain types of ships. This has, more or less, unbalanced everything, and as the Conference was proposed by the United States Government, it is only natural that American naval policy should, for the moment, be of some interest. Quite as an aside, it is here seriously suggested that the League of Nations should propose an international agreement providing that, in case of war, the members of the cabinets and the legislative bodies of each country involved in the war, shall be the first to be sent to the fighting front. This would not only automatically modify those foreign policies which are irritating to others, but would also guarantee that they would be pursued with better judgment, and equally insure such provision for naval and military establishments as would make war prohibitive.

## DECLARATIONS OF STATESMEN.

George Washington, in his first annual message to Congress, said :

> A free people ought not only to be armed but disciplined ; to which end a uniform and well digested plan is requisite ; and their safety and interest require that they should provide such manufactures as tend to render them independent of others for essential, particularly military, supplies.

The late President Harding, in his inaugural address as President of the United States, on March 4, 1921, outlined his views as to the proper naval and military policy for the United States, as follows :

> Let me repeat for our nation, we shall give no people just cause to make war upon us ; we hold no national prejudices ; we entertain no spirit of revenge ; we do not hate ; we do not covet ; we dream of no conquest, nor boast of armed prowess. If, despite this attitude, war is again forced upon us, I earnestly hope a way may be found which will unify our individual and collective strength and consecrate all America, materially and spiritually, to national defence.
>
> I can vision the ideal Republic where every man and woman is called under the Flag for assignment to duty for whatever service, military or civic, the individual is best fitted for, where we may call to universal service every plant, agency or facility, all in the sublime sacrifice for country, and not one penny of war profit shall inure to the benefit of private individual, corporation or combination, but all above the normal shall flow into the defence chest of the nation. There is something inherently wrong, something out of accord with the ideals of representative democracy, when one portion of our citizenship turns its activity to private gain amid defensive war, while another is fighting, sacrificing or dying for national preservation.
>
> Out of such universal service will come a new unity of spirit and purpose, a new confidence and consecration, which would make our defence impregnable, our triumph assured. Then we should have little or no disorganization of our economic, industrial and commercial systems at home, no staggering war debts, no swollen fortunes to flout the sacrifices of our soldiers, no excuse for sedition, no pitiable slackerism, no outrage of treason.

In December, 1920, the late President Harding also said :

> A big Navy and a big Merchant Marine are necessary for the future of this country. I believe in partial but not permanent disarmament and I foresee the time when this will be realized, but, until that time arrives, I want a Navy for America's defence that is equal to the aspirations of this country.

He also said in April, 1921 :

> The United States does not want a thing that is not rightfully her own ; we do not want any territory ; we do not want tribute, but we want what is righteously our own, and, by the Eternal, we mean to have it.

These words may be taken to mean more than appears on the surface, but he made good his " partial but not permanent disarmament " ideas in the Washington Conference, which has incidentally wrought such havoc with naval policies and building programmes.

## A NAVY SECOND TO NONE.

A year after the Conference, the General Board of the Navy got its bearings and said : that " the Navy of the United States should be maintained in sufficient strength to support its policies and its commerce, and to guard its continental and overseas possessions." That might be the naval policy of any other country, but it has been the policy of the General Board for many years. It also announced that it was the duty of the United States : " To create, maintain and operate a Navy second to none and in conformity with the ratios for capital ships established by the Treaty for the Limitation of Naval Armaments."

It will be noted that it does not say " *but* in conformity with," but it does say " *and* in conformity with." This suggests that the Washington Agreement implies an *obligation* to maintain a ratio of 5 : 5 : 3. The necessity for living up to the Agreement gives both France and Italy, for instance, overwhelmed as they are with debts, the tacit approval of two of their creditors to embark on large expenditures for naval rehabilitation. France has a legitimate grievance in that she was dis-rated by the Conference as a first rate Naval Power, whereas, even had the Conference voted a 5 : 5 : 3 : 3 policy and placed France on a par with Japan (which should have been the case), France would not have been able financially, nor would she have had the desire, to build battleships, since her special needs are for cruisers, destroyers, submarines, and aircraft. The inference is, from the official utterances above quoted, that the informed opinion of the United States is in favour of universal military service, for a big merchant marine and for as large a Navy as is permitted by the Washington Conference—equal to the " aspirations of this country."

### CONSCRIPTION AND VOLUNTARY SERVICE.

The reason for this is not far to seek. The voluntary military system is both dangerous and costly. It took Great Britain from August, 1914, to the summer of 1916, until the battle of the Somme, to create an effective army. It took the United States from April, 1917, to September, 1918, to put an effective force on the battlefields of Europe, and in the succeeding two months, the lavish reinforcements were just enough to turn the scale into a partial victory that has not yet borne fruit in reparations. The world saw the voluntary system call to the harvest of death the flower of the youth, and those who remained behind to be conscripted to the fighting line, and those who stayed at home are now governing or dictating national policies. The late President Harding has properly characterized the profiteering and the " swollen fortunes to flout the sacrifices " of the military services. For all that, it must be recognized that the Navy now, and always will, call for voluntary service. In time of peace and prosperity, it means difficulties in recruiting, but, in time of war, it brings into service a superior type of man. This in no way denies the righteousness of the principle of universal military service as enunciated by the late President Harding.

In no other country are its foreign policies so bald, so clear-cut and so well supported by public opinion as in the United States, and, therefore, it might seem that American naval policy should have no uncertainties as to its responsibilities. For one thing, none of its foreign policies are aggressive, but all purely defensive.

The cardinal principle, and the one from which all the others take colour, is that which was given to the country by George Washington —" No Entangling Alliances." In spite of this, America won her original independence by an alliance with France ; the Treaty of the

Limitation of Armaments is, in effect, a limited and temporary alliance; and, if America joins the League of Nations later on, after it proves itself to be sufficiently innocuous as to its war powers, it will be a wholesale entangling alliance. The "Monroe Doctrine" itself may be regarded as a Pan-American alliance, although some of the Central and South American countries do not accept it. That, however, is not important, as the Monroe Doctrine is as obligatory on all of them as it is on other countries. It is, in fact, a one-sided alliance in that we bind ourselves, if necessary, to do all the work of defending them against foreign aggression, whether or not any of the countries concerned like it. We, therefore, as a fundamental of foreign policy do not necessarily look for any help in case we are involved in war, and this fact alone calls for a Navy second to none, to give the Army a chance to mobilize. It is a fundamental principle of naval policy that a Navy shall always be in a condition of "mobilization" for war except as to actually calling naval reserves into service.

## THE MONROE DOCTRINE.

The Monroe Doctrine dates from 1823, but there have been read into it since then many broader meanings. It not only means non-interference politically, non-colonization and non-acquisition of any territory in the Western Hemisphere, but it means no binding "concessions" which amounts to "cessions" of areas, giving rise to those "spheres of influence" which have, within the memory of living people, entirely partitioned Africa (except only Abyssinia and Liberia) and is merrily on its way in Asia. On this question of America's opposition to "concessions" in the Western Hemisphere, Mr. H. N. Brailsford, in his book, "The War of Steel and Gold," states that "In this doctrine Europe is not likely to acquiesce, and America may soon be the field of a conflict as acute as any that Turkey and China have witnessed."* This in itself constitutes an excellent argument in favour of a large Navy.

The United States has invaded the sovereignty of Cuba several times in the past, and is now in military occupation in Hayti, San Domingo, and Nicaragua, but only to restore order and to prevent questions arising with European countries which might seem to justify naval landing parties. It is a defensive and not an aggressive policy. For instance, Germany, in 1913, had well formed ideas of challenging the Monroe Doctrine by taking advantage of political chaos and of German commercial financial claims in Hayti and San Domingo. She even went so far, after the small success of Lord Haldane's mission to Berlin, as shamelessly to propose to a British Cabinet, as the price of an understanding or agreement on the restriction of naval tonnage, to do this, provided Great Britain would give her a free hand. The British Cabinet naturally declined to "hold the bag," but it gives a reasonable explanation of why well-informed American public opinion favours open diplomacy and is shy of such cold-blooded methods.

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* This writer can be regarded as expressing only a personal and not a representative opinion.—THE EDITORS.

## INFLUENCE OF SECRET TREATIES.

The disclosure, by the Paris *Matin*, in November, 1911, of the secret clauses in the Anglo-French and Anglo-Spanish treaties of 1903–4, which made a " scrap of paper " of the Algeceiras Pact of 1905 before it was even signed, has also given a certain amount of natural hesitation to thinking Americans from entangling themselves in European conferences and agreements. The series of secret treaties made between the Allies, during the war, chilled American ardour, after the Armistice, when they became known principally through recriminations on account of being entirely disregarded.

Admiral Mahan has said that the Monroe Doctrine is as strong as the United States Navy and no stronger. There is no question but that America will go to war to-morrow in defence of the Monroe Doctrine, if necessary, so this fact would seem to call for a Navy second to none. This gives considerable comfort to Canada whenever she is inclined to feel anxious on questions of Empire defence. National safety being the underlying principle of the Monroe Doctrine, any danger arising in the region of the Caribbean Sea, and in the Pacific in the region of the Panama Canal, is obviously of great concern to the United States.

## OTHER AMERICAN FOREIGN POLICIES.

" The Control of the Caribbean Sea " and the " Defence of the Panama Canal " are merely corollaries of the Monroe Doctrine as being vital to our national security. The purchase of the Danish West Indies by the United States was dictated by this necessity, as would be the similar acquisition of other islands in the Western Hemisphere from European owners in cancellation of debts resulting from war loans. As a matter of fact, the United States has acquired nearly all of her colonial possessions by purchase, even after successful wars, and has learned never to look too closely as to how the titles were acquired by those parting with them. American control of the Caribbean Sea is essential to the security of the Panama Canal, as the Canal was built primarily for its strategic and military value. Its loss would automatically reduce the strategic value of the United States Navy fifty per cent. The building programme, which was suspended by the Washington Agreement, was intended to off-set the danger of such a contingency, and, therefore, it would still seem to call for a Navy second to none, as the United States faces equally on two great oceans.

In the same way, the policy of the " Open Door," in countries in which all have equal political and commercial rights, makes for universal peace by giving to all that access to the raw materials they need. The United States has stood for it, not only in China, but more recently both in Turkey and in Tangiers, and expects to continue to pursue this equitable policy. In the past, the knock on the closed door has been heeded in proportion to the power behind the knock, but, once opened, the door has always remained so.

The policy of " Asiatic Exclusion " is merely a question of not having the standard of living in the United States lowered by cheaper labour. It is absolutely an economic and not a racial question. Curiously enough, although Canada, Australia, and New Zealand have the same policy, it is not considered racial in their cases, but only in our own. While it is the earnest desire of the people of the United States to discourage racial admixture, this has nothing to do with the motives of Asiatic exclusion. Politically, it has been much overworked to create a sentiment against the United States, but the policy represents what is considered to be the best national interest.

In the days of free immigration into America and of easy naturalization, the United States nearly went to war, on several occasions, over the impressment of seamen and double citizenship ; but it has learned to admit the right of other nations to a certain control over their native born subjects. Now that European immigration is restricted and Asiatics excluded, new problems confront the United States, but they are not questions to go to war about, but only for diplomatic adjustment. It only shows how domestic policies often become foreign policies--like prohibition, for instance.

### " A Grave Mistake."

" The Independence of the Philippines " is now an accepted principle of American Foreign Policy, but there is a string to it. How soon it can be realized depends, not only on how soon the Filipinos will be capable of governing themselves, but on the safety of the islands from being taken over by any other Power. This would have to be settled by an international agreement. The greatest diplomatic slip the United States has ever made in its history was in allowing itself to be bluffed out of the purchase of the Caroline and Marshall Islands in the Peace Conference in Paris, in 1899, following the war with Spain. Germany, before 1898, was scheming to acquire the Caroline, Marshall, and Philippine Islands from Spain. The Spanish-American War was a keen blow to these aspirations. We, however, generously paid Spain for the Philippines and Guan, but the Spanish Delegates held out against parting with the Caroline and Marshall Islands. It was not realized that Germany was diplomatically blocking this until a few years later when she herself acquired them. America had in her grasp a continuous " Trans-Pacific Route to Asia " and let it slip. The Washington Conference completed the work and America has now a thorny path in the Pacific. For the cost of one battleship, Guan could have been made impregnable, but the Congressional " Pork Barrel " needed the money. The independence of the Philippines will undo the remainder of the epic work of the great sailor and diplomat, George Dewey.

### " The Freedom of the Seas."

" The Freedom of the Seas " is an old-time slogan of American foreign policy, which formerly meant :

(1) Free Ships make free goods.
(2) Exemption of private property from capture at sea.
(3) Safety of non-combatants and neutrals on the high seas.
(4) Denial of dominant belligerent rights on the high seas.

All these implied the right to the free use, by all mankind, of the sea and highways of commerce. These all went glimmering during the World War, but the United States has taken to heart its lesson. It sees that a Navy second to none can apply the rules of International Law in imposing its will upon the enemy without regard to neutral rights, and without the Declaration, but with the example of London.

Prior to the World War, Great Britain did not ratify the Declaration of London, which was a body of laws, recommended by the Second Hague Conference, for the guidance of an international prize court, but it mistakenly accepted it after the war was declared, in agreement with the Allies, with certain omissions and modifications. After further modifications by Orders in Council, Great Britain finally, on July 7, 1916, withdrew her adhesion to the Declaration of London and announced her intention " to exercise her belligerent rights at sea in strict accordance with the laws of nations."

Gradually the Allied list of contraband was extended to include nearly every article of commerce ; the right of search was extended to include the right to detain all commerce on its way to or from enemy countries by direct route or through neutral countries ; no distinction was allowed between contraband and innocent goods ; it was claimed that all goods afloat that might in any way reach the enemy were lawful prize ; the usual declarations and notifications of blockade were achieved without any formal announcement ; the belligerent right of visit and search was extended to one of detention for the purpose of search ; and the right of seizing passengers on neutral ships was freely exercised. The frequent protests of the United States Government to these apparent irregularities in restraint of her neutral trade rights were answered by : " It would seem to be a fair reply to such a contention that new devices for dispatching goods to the enemy must be met by new methods of applying the fundamental and acknowledged principle of the right to intercept such trade."

### CRITICISM OF THE BLOCKADE 1914–1918.

But according to the book of Rear Admiral Consett, British Naval Attaché in the northern neutral countries throughout the World War, called " The Triumph of Unarmed Forces," all these irregular proceedings failed in their real purpose, as shown by the following quotations from the *Morning Post* (London) of May 10, 1923 :

> From the evidence he cites, Admiral Consett draws the conclusion that the prolongation of the war from the six months or the year, for which Germany had calculated her reserves, to four and a half years, was mainly due to her supply, by British traders, of foodstuffs and the materials for munitions. The enemy was thus continuously supplied until 1917, when, with the entrance of the United States into the war, the blockade was for the first time enforced. . . . It cannot possibly be contended that either British traders or the British Government were under the least delusion that the excess of the usual exports to neutrals—amounting to double, treble, and even ten times pre-war amounts—did not go to Germany, either by re-export or in the shape of manufactures. . . . Admiral Consett observes that : " These excessive supplies to Germany, together with those that passed through Holland, were all probably more than enough, had they been withheld, to have sounded Germany's death-knell at an early date." Admiral Consett shows that the agreements made by neutrals as

to supplying the enemy were waste paper. . . . and gives details of the total disregard of agreements in respect of every commodity required by the enemy. That information was, of course, furnished to the Government at the time. *It will be observed that supplies could have been stopped by a simple prohibition of exports.* The Navy would have prevented smuggling.

The lack of a more legal basis of the blockade of Germany by the Allies is dealt with very ably by Mr. Archibald Colbeck in Chapter IX of "Brassey's Naval and Shipping Annual for 1924." What he says in the conclusion of his article is as follows :

> If, then, the nation which is dominant at sea has a large number of neutral clients, she can close bargains with them to the detriment of the enemy, and a modern blockade consists in these bargains and agreements. Neutral clients of Great Britain, who were obliged to choose between two very serious alternatives, generally chose the one which was least damaging to themselves ; that is, compliance with our demands, as the industries of a large part of Europe, the railways of a greater part of South America, and the sea-borne commerce of more than half the world depended upon British coal, we were generally in a position to enforce our wishes.

This last did not, of course, apply to the United States with her unlimited coal supply, and, moreover, through the fact that our Consular and Diplomatic Corps remained in Germany until April, 1917, the Government of the United States was cognizant of most of the facts set forth by Rear Admiral Consett as revealed in his book. That explains why the blockade became effective as soon as the United States entered the war, and was one of the reasons why the large building programme was continued after the Armistice, in appreciation of the similar advantage of a Navy second to none.

## The American Form of Government.

The Constitution of the United States is the oldest written one in the world, as it dates from 1787. The distribution of the powers of government between three co-ordinate branches, executive, legislative, and judicial, has had the curious result of giving the President more real power than any other ruler and than as originally contemplated ; of restricting any usurpation of the separate States and of the legislative branch through the power of the Supreme Court to make all laws conform to constitutional requirements ; and for holding Congress responsible for nearly everything else. The great American "joss" is public opinion—not to be confused with that of the press—although assumed to be all-powerful, it cannot, as in parliamentary States, turn out of office the governing party in power except at stated intervals, viz. the House of Representatives and one-third of the Senate every two years, and the President—who is also Prime Minister and leader of his party, three in one—only at the end of his four years' term. Nor are the members of the President's Cabinet responsible, in tenure of office or anything else, to the legislative body once their appointment by the President has been confirmed by the Senate. They are beholden only to the President, who may ignore their individual or collective opinions and who may call for their resignations and ease them out at will.

On the other hand, a treaty negotiated by the President and his Secretary of State cannot be effective until ratified by at least a two-third majority of the Senate. This control eliminates the possibility of secret diplomacy and secret clauses in treaties, which is the curse of Europe to-day, whereby secret clauses may be suppressed in published treaties, and secret agreements may be made by politicians temporarily in power, whereby "the happiness, the prosperity, and the lives of millions of people are often placed in deadly peril without their knowledge or consent." The net result of the American system is stability, conservatism, and continuity in Foreign Policy, since public opinion must have necessarily approved of the foreign policies and, therefore, will stand at the back of any Government official who sustains those policies.

Perhaps these are mere platitudes. But failure to grasp such elemental facts has led, on the one hand, to Europe not understanding why President Wilson had to submit the Treaty of Versailles and the American gurarantee of the French security (similar to the British) to the United States Senate; and on the other hand, to the Senate's refusal to ratify either Treaty. While this has shocked Europe, public opinion in America has been no less shocked by the secret agreements in the pockets of delegates sitting around European Conference Tables. In the United States it is next to impossible to keep military and diplomatic secrets for very many months—and a good thing it is too—whereas secrecy is second nature in a European or Oriental. Publicity is not a bad thing in its way, for the word " secret " may hide many sins both of omission and commission, and, with publicity, even of secrets, no one knows just what to believe. European people do not understand American loquacity, for, through training, through the nearness of countries to each other, and by custom, Europeans are more evasive, more guarded and more uncommunicative. These qualities are particularly emphasized in England, and in no country is there more real secrecy, tenacity of purpose and reserve. Both loquacity and reserve are permissible in a poker game, but the real test is in being a good loser, and in that nearly all Anglo-Saxon peoples excel. All this has to do with the subject, because the American naval policy must be an open book, and few other countries in the world seem to believe it.

## THE GENERAL BOARD.

" Brassey's Naval and Shipping Annual, 1921–22," p. 34, gives a very good account of the functions of the General Board of the Navy Department. Its duties are advisory and it has no authority in law for its existence. Nevertheless, its high standing has been, in the twenty-four years of its existence, like a gyroscope, pointing to the true goal of national security through a well-balanced Navy. However " unbalanced " the United States Navy is to-day, it is not because of the General Board's proposed annual building programmes, but because their recommendations have not been followed out by Cabinets and Congress. As an illustration of its methods, the writer's experience may be interesting. On returning from Europe in May, 1919, from service afloat during the war, the writer found himself, for a second time, a member of the General Board. Hearings were then in progress daily on the aviation section of the proposed naval building programme for the following year, and representatives of all the Bureaus of the Navy Department and of the Marine Corps were giving their views on the needs of the Navy as disclosed both by experience in the World War and in accordance with the progress being made through improvements. At the end of several weeks' hearings, those who had given their views were assembled in the Board Room and a so-called programme for naval aviation was read out and pronounced satisfactory. Much to the surprise of every one it turned out to be the old programme of the General Board three years previously, which only goes to show that it is practicable to plan a long way ahead. The new programme was then read out and it is still very much the programme of to-day, since Congress has only adopted it in part.

While it may be said that the General Board has always proposed a consistent, well-balanced and continuous building programme, yet the various Secretaries and the Presidents themselves have altered it for their own reasons before submitting it to Congress, and that body has still further modified it. For one thing, it has always been easier to get battleships out of Congress than any other type of ship, not because they are named after the various States (which has had some little weight), but because it was willing to build three or four ships of any type, so battleships were naturally chosen. In 1898, Congress actually presented the Navy with four monitors of 3225 tons displacement, each carrying two twelve-inch guns in one turret. No one had asked for them and the Navy Department did not necessarily want them. This liberality was due to the fact that the Bath Iron Works, in Maine, which had made a fine record with destroyer building, had then reached the stage in its development when a monitor would just suit. As the Speaker of the House, the President *pro tem* of the Senate, the Chairman of both the House and Senate Naval Committee were all from Maine, the Bath Iron Works got one of these monitors to build and three other shipyards were incidentally made happy. This parochial method of combining the needs of foreign policy with the exigencies of local politics naturally unbalanced the General Board's programme. Sir John Biles knows of this incident, as he was acting in an advisory capacity in other matters in the United States at the time, much to the improvement of the *matériel* of the United States Navy.

## THE WASHINGTON CONFERENCE.

Textually, the Washington Conference limited the numbers and also both the total and individual tonnage displacement of capital ships (battleships and battle-cruisers); the total tonnage of aircraft carriers and their maximum individual displacement; restricted the calibre of guns in each class; and defined the use of submarines in war. It thus abolished competition in building of two classes of ships only, viz. battleships (or battle-cruisers) and aircraft carriers. There is no restriction as to size and numbers in building cruisers, flotilla leaders, destroyers, and submarines, except as to not being over 10,000 tons displacement or carrying larger calibre guns than eight inch. Unrestricted competition in design has always resulted in constant increase in the size both of ships and guns, and therefore the above restrictions have limited competition to that extent.

The United States holds that the Washington Agreement contemplated 100 per cent. efficiency in the existing battleships and battle-cruisers as long as no change is effected in existing calibre and disposition of guns (and not more than 3,000 tons in defensive alteration are added to the displacement). The exact wording of the Treaty is: " No alteration in side armour, in calibre, number or general type of mounting of main armament shall be permitted." The changes proposed in gun elevation would consist, not in type of gun mounting, but in cutting away some of the plates and framing under the breech of the gun; increasing the size of the gun ports; lengthening the elevating screw; changing slightly the position of the ammunition hoist and strengthening the counter-recoil system. The British Government's official objections to the increase in the elevation of the 14-inch guns in ships carrying them, in order to enable them to utilize the fire-control installations of new battleships scrapped on the ways, and, in re-boilering old ships, to change from coal to oil burning, has deeply puzzled American public and naval technical opinion. An editorial in the (*British*) *Naval and Military Record* of April 9, 1924, says: " Where do ' repairs ' leave off and where does ' reconstruction ' begin? The Renown, for example, which has been for more than a year in dockyard hands at Portsmouth, is undergoing what would be generally described as a pretty general reconstruction." * The question really amounts to this: Are taxpayers willing to spend money in reconstructing older ships as museums? Americans instinctively scrap machinery that is not up-to-date, and demand the latest type of everything.

## THE PROBLEM OF NAVAL BASES.

American concessions in the Washington Conference are all but forgotten, except by American naval officers, who, while more than willing to see armaments limited, are opposed to limiting progress and design. Nor do American naval officers find any solace in Article XIX of the Treaty, which begins:

> The United States, the British Empire, and Japan agree that the status quo at the time of the signing of the present Treaty with regard to *fortifications and naval bases* shall be maintained in the respective territories and possessions.

The rest of the Article defines it to include everything insular that Japan now owns or may acquire outside of her islands comprising Japan proper. It includes the Aleutian Islands and everything insular, present or future, under the American flag west of the Hawaiian Islands; and it includes Hong Kong and present or future insular holdings of the British Empire east of 110 degrees E. longitude, excepting the Canadian Islands, Australia and its territories, and New Zealand. The original proposal of the United States made no mention of the naval bases or fortifications or coast defences, and the words " fortifications *and* naval bases " instead even of " fortifications *of* naval bases " were willingly accepted by the United States delegates, but with sadness by their naval officers. The final paragraph of Article XIX drove the last nail in sealing the future of the United States in the Western Pacific :

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* The work on the Renown was specifically classed in the Treaty, by implication, as a " reconstruction " prohibited by the Treaty.—THE EDITORS.

> The maintenance of the status quo, with the foregoing provisions, implies that no new *fortifications or naval bases* shall be established, in the territories and possession specified ; that no measures should be taken to increase the existing naval facilities for the repairs and maintenance of naval forces, and that no increase shall be made in the coast defences of the territories and possession specified.

Meanwhile, the British Navy has, equally to the regret of the United States Navy, failed to get provision for a naval base at Singapore, but there is nothing in the Treaty which prevents the development and fortification of a naval base at Kowloon, opposite Hong Kong, as it is the leased territory and on the main land of China, hence not insular.

The Treaty makes the 5 : 5 : 3 ratio for the United States much less than it appears as it fronts on two oceans with practically no outlying naval bases, and it marks the waning of the prestige of the United States in the Far East.

The failure of the Treaty to limit aggregate tonnage of auxiliary combatant ships other than aircraft carriers has unbalanced programmes, policies, and ratios of floating strength, and practically defeated the " balanced programme " offered by the United States at the opening of the Conference. The sincerity of the United States is manifested further in the scrapping of twice as much as any other country of new tonnage laid down or about to be laid down, for which expenses had been incurred in the assembling of material. This has been lost sight of by the delay in scrapping due to the failure of France promptly to ratify the Treaty, but the scrapping of new construction was the kernel in the nut which appealed to the other Powers in the Conference.

The Treaty accepts, as it should, the practical admission of Japan's dominating position in the northern half of the Western Pacific, but transfers the guardianship of the " Open-door Policy in China " to the signatory Powers, for which, in case of necessity, the United States will be the spokesman, as it has been in recent years of its own freewill. With the reduced position of the United States under the Treaty, there is the implication that the Powers concerned might, by united action, take measure against any violators of its terms. However, the " Open-door in China " is one of the great achievements of the Conference and the one on which the United States felicitates itself in particular.

ALBERT P. NIBLACK.

# CHAPTER IX.

## NAVAL BASES AND FIGHTING POWER.

THE controversy which has raged round the scheme for modernizing Singapore has at least served to recall the fact, which there is a tendency to forget, that Sea Power rests on bases no less than it does on warships and *personnel.* Without the facilities for replenishing and effecting repairs afforded by a number of properly equipped oversea bases the mobility of a fleet is restricted to its radius of action from its home ports.

The extent of the British Empire makes it imperative that our influence on the high seas should be world-wide. Peace strategy is as important as war strategy, particularly to a World Empire like the British Commonwealth of nations. If the British Battle Fleet is able to navigate, whenever the occasion demands it, in the waters surrounding the most distant of the Dominions, a feeling of confidence is inspired in them at seeing this concrete sign of the Empire's strength and ability to defend them.

But to carry out this Peace Strategy it is essential that the Dominions should provide, or take their share in providing, any new base and in maintaining other necessary existent bases in a proper up-to-date condition.

### THE BALANCE OF RESPONSIBILITY.

In 1897, on the occasion of the Diamond Jubilee, at a meeting of the Colonial Premiers, Mr. Goschen, the First Lord, said on the subject of Colonial Defence that the Admiralty would rely upon the localities themselves for the defence of the ports, while the Admiralty would undertake that no organized squadron should be directed against any part of Australia. The part of the Royal Navy is clearly defined in that statement, which embodies also the principles of sound strategy and economy. Although it was made twenty-seven years ago, it needs only reaffirming to-day. If this principle is carried out to-day the mobility of our fleet will be ensured by bases situated at such strategical points that our ships can strike in any quarter where the security of the British Empire and the Dominions is threatened.

### HISTORY OF BRITISH BASES.

Existing British naval bases throughout the world have not grown up haphazard, nor has their acquisition been dictated by mere opportunism. The origin of each can be traced directly to the particular work the fleet was required to do from it. We also owe it to the sagacity of our forefathers that, appreciating the difficulties of acquiring, and the recurring need for, these bases, they generally retained possession of them as a condition of making peace.

The great naval bases at home owe their origin to strategical situations in the past. For instance, Henry VII. converted the commercial port of Portsmouth into a Royal Dockyard as a counter measure to the use of Honfleur and Cherbourg as naval ports by France, then our chief enemy. Chatham owes its development to the Dutch wars. Plymouth became necessary when it was found that Portsmouth was too far distant for the conduct of operations off Brest. In recent times, the need for a base capable of maintaining a large fleet on the East Coast brought about the development of Rosyth.

Abroad, the development was similar. In the days of Cromwell our Navy, for the first time, became a serious factor in the Mediterranean; but we were for long dependent on the goodwill of Spain for the maintenance of our fleet in that sea. The danger of such dependence was made manifest when the quarrel over the Spanish succession deprived us of the free use of Spanish ports, particularly of Cadiz. Our pressing need for a base impelled the unsuccessful attempt to seize that place in 1702. It was not until two years later, when Rooke captured Gibraltar, that we acquired a firm footing in the waters of Southern Europe.

As our operations extended further into the Mediterranean, Minorca and Malta came into our possession and proved invaluable. Now we see the chain of our communications with the Far East linked up by Port Said, Aden, Bombay, Colombo, Singapore, and thence via the ports of Australia and New Zealand, across the Pacific to Esquimalt on the west coast of Canada.

## Bases in the Atlantic.

Looking across the Atlantic we see how our efforts to guard our West Indian possessions and our vast interests in North America produced bases at Bermuda, Jamaica, and Halifax. The great importance of the Cape Route to the East in the past led to the development on its flank of Sierra Leone, Ascension, St. Helena, Simons Town, and Mauritius, and also into the Indian Ocean. The Suez Canal has diverted the course to the East to the Mediterranean route; but the volume of sea-borne trade in the South Atlantic, particularly to South America, has nevertheless enormously increased; and the late war showed that, with few exceptions, the importance of our African bases has increased rather than diminished. It also showed our serious lack of bases in South American waters, both in the Atlantic and in the Pacific.*

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* The Falkland Islands gave the only naval base in the South Atlantic Ocean.

## Increased Reliance on Bases.

The advance of maritime science has only increased the dependence of warships on bases. In the days of sailing vessels fresh water and provisions, of which vessels carried supplies to last for several months, were the chief factors which determined the length of time a ship could keep the sea. Now fuel endurance is the main consideration; but the complex machine which is the modern man-of-war also demands far more elaborate repairing and docking facilities than her prototype. Whereas it was no uncommon thing for a fleet of sailing ships to be out of port for months on end, it would be a severe strain on modern ships to be away for as many weeks, even if difficulties of refuelling could be overcome. There is now in addition the menace of the submarine, which has rendered it dangerous for capital ships, or any ships not designed for avoiding and attacking submarines, to remain at sea for a prolonged period in hostile waters. Not only is there a continual risk, but the moral strain on the *personnel* is such that efficiency must deteriorate if it is unduly protracted.

More than ever, then, must a fleet have a secure base from which to operate.

## Permanent and Operation Bases.

In dealing with this subject it is necessary to differentiate between Permanent Naval Bases, maintained in times of peace, and Operation Bases, used as " jumping off " positions for the fleet in war.

Permanent bases can be divided, broadly speaking, into two classes, *i.e.* Primary Bases capable of docking, repairing, and storing the main fleet; and Secondary Bases, which may have limited repairing and storing facilities or may be ports equipped only for fuelling and provisioning ships.

Those in the first category will be the principal naval dockyards with shore works and establishments on a large scale, graving docks, and permanent defences. The second category will include the lesser dockyards, naval ports and anchorages, where there is no dockyard, and mercantile ports. Some of these by reason of their strategical position or commercial importance also have permanent defences. In some cases they could cater for the principal requirements of a squadron of light ships, even though they cannot be regarded as adequate bases for the main fleet.

A permanent base may also be an operation base, but the tendency of modern warfare is to make it necessary for a fleet to operate from a more advanced position than can now be regarded as safe for its repair base. The danger of air raids and bombardments is one which may have to be accepted for an operation base to a degree which would be highly undesirable in the case of a dockyard with the huge target presented by its works and storehouses.

Where the operation base is not also a permanent base, its position and equipment will be determined chiefly by strategical considerations (*q.v.*). It may remain little more than a safe anchorage with extemporized defences against torpedo attack, or it may expand into a place with equipment and defences secondary only to those of a naval dockyard.

### AMERICAN CONCEPTION OF A MOBILE BASE.

An organization which has received much attention in the United States is the "mobile base." This is really designed to include floating docks, cranes and workshops, depot, store, repair and hospital ships, ammunition carriers, tankers, and innumerable other auxiliaries for equipping an advanced position to serve the double purpose of a repair base and an operational base. The project is a fascinating one, but requires approaching with caution, or it will lead to an unwieldy collection of units, far more numerous than the fleet itself. The limited mobility of such an organization, in practice, might seriously delay operations at the outbreak of war, if it came to be regarded as a substitute for prepared bases, especially in distant parts of the world where it could not function for many months.

The main point is, and it cannot be too strongly emphasized, that there must be a fully equipped and safe repair base in support and within convenient reach of the fleet whenever and wherever it embarks on prolonged operations. Without such provision for its maintenance a fleet will be exposed to unjustifiable risks which may react on our whole naval position.

A base of the requisite proportions to support the whole main fleet cannot be extemporized without prohibitive delay in the conduct of the war. This argues the necessity for permanent dockyards at strategical centres, maintained at the proper standard of strength and equipped in accordance with the needs of the fleet, built and building.

The matter is of special importance in view of the redistribution of naval force which might become necessary in the event of any disturbance in the balance of naval power.

### STRATEGICAL CONSIDERATIONS.

From a strategical point of view there are three principal aspects from which bases must be considered :—

(A) Geographical situation.
(B) Military strength.
(C) Resources.

A. *The Geographical Situation.*—The geographical situation is obviously the most important condition because it is strategically vital and cannot be altered after the situation has been selected, while military strength can be built up and resources can be increased and developed.

The geographical selection of a base depends on the functions it is required to fulfil. An operation base, as we have seen, may or may not be also a repair base, but if not it may have to cover and, in any case, must be within convenient distance of the repair base, and have secure communication with it. Examples of such interdependent operation and repair bases are Scapa Flow and the three Royal Dockyards: Portsmouth, Plymouth, and Chatham (prior to the completion of Rosyth), Mudros and Malta, Dunkirk and Dover, in the late war, or the Elliot Islands and the Japanese dockyard ports in the Russo-Japanese war.

The strategical value of an operational base will depend chiefly on its position relative to the *object* or function of the ships using it. If it is the position from which the main fleet is to strike, it must be so situated that the interception of the enemy's main fleet, before it can do harm, will be certain. In other words, it must enable the main fleet to *cover* the whole of the naval dispositions.

An " operation base " from which it is intended to carry out a landing operation against opposition, may have to serve the double purpose of a port of re-embarkation from sea-transports into landing craft and an outpost from which to defend the sea communications after the expedition has landed. The former postulates the minimum distance to be covered by craft ill-suited to carry troops and their impedimenta for a prolonged sea passage.

On the other hand, the danger of attack, especially from the air, may rule out a position so far forward. In operations of this kind it will be seen, therefore, that the selection of a base is largely governed by tactical considerations. These are too numerous to elaborate in detail here.

### THE " DISTANCE " FACTOR.

Another type of operation base is one lying on the flank of a trade route, to which cruisers guarding that route must repair for fuelling and provisioning. If conveniently situated it will have the effect of reducing the number of ships required on a particular beat, always subject to the strength of the enemy force which has to be countered.

The whole question of " distances," whether of the fleet from its operation base or of the latter from the repair base, is closely correlated with that of the speed and fuel endurance of ships. Obviously it will be a serious handicap if the fleet has to expend a large proportion of its fuel in steaming from its base to the scenes of action, or if cruisers have to waste many days at sea before they can reach their patrol ground.

Similarly, if the repair base is far distant from the operation base the time ships are absent from the fleet for refitting will be prolonged, more fuel will be expended on the passage between the two places, and increased stores of fuel will be necessary at the advanced base.

The importance of distances in this matter of bases stands out throughout naval history.

Bizerta owes its origin to the fact that when relations between this country and France were often strained at the end of the last century, the French found Toulon too far from our Mediterranean communications to menace them, just as we, in earlier days, had found Gibraltar too distant a point for our fleet watching Toulon and had seized the more convenient port of Minorca. In more recent times

Scapa Flow proved too far north a station from which the Grand Fleet could intercept raids from Germany. This led to the transfer of the whole of the Grand Fleet to Rosyth as soon as the defences of that more southern port had been completed.

## SITUATION IN THE FAR EAST.

Turning to the question of naval fuelling anchorages in the East, we see from the accompanying table of distances that the majority of the ships of the British main fleet, steaming to the Far East or to Australia and New Zealand from Malta, would, in order to have ample fuel in hand for emergencies while on passage, be forced to refuel at Port Said, Aden, Colombo, and Singapore * *en route* to Hong Kong or Australia.

TABLE I.—DISTANCES BETWEEN FUELLING STATIONS.

| Stage | Miles. | |
|---|---|---|
| Malta<br>Port Said | 937 | 6005 |
| Port Said<br>Aden | 1394 | |
| Aden<br>Colombo | 2107 | |
| Colombo<br>Singapore | 1567 | |
| Singapore<br>Hong Kong | 1459 | |
| Singapore<br>Port Darwin | 1887 | |
| Singapore<br>Port Moresby | 2852 | |
| Singapore<br>Labuan | 748 | |
| Colombo<br>Fremantle | 3121 | |
| Colombo<br>Port Darwin | 3364 | |

If a fleet has to steam to its war base at a very slow speed, in order to eke out its fuel, there will be increased risk that this base will have been captured or besieged before the fleet can arrive. This emphasizes the importance of safe fuelling stations at well spaced intervals *en route* to a distant theatre of war. In time of peace a certain emergency may arise, which necessitates the main fleet being sent to a distant part of the British Empire. The speed of the fleet is its best asset; and is in direct proportion to the number of bases along its route.

We have grown so used to thinking in terms of the short distances and narrow waters which separated us from our enemy in the late war, that it is particularly necessary to study large maps in order to appreciate the true significance of the situation in the Far East.†

And in this connection the strategical advantage of alternative operational bases, particularly for an inferior force, must not be overlooked. That a squadron with a choice of bases may present a most harassing problem to an enemy, causing him to dissipate his strength and give opportunities for being defeated in detail, must be set against the drawbacks of duplicated supplies and defences which have been entailed by their provision.

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* Singapore is the nearest protected British port to Colombo in the Far East.

† Across the North Sea from Scapa Flow to Wilhelmshaven the distance is 508 miles; from Sydney to Colombo it is 5,261; to Yokohama, 4,331; to San Francisco, 6,456; to Singapore, 4,556; and to Port Darwin it is 2,895 miles.

## THE DANGER OF ATTACK.

B. *Military Strength of Naval Bases.*—The military strength of its bases is a matter of vital importance to the Navy. The defences must be such that these places can resist attack until relief arrives or remain secure while the fleet is operating elsewhere and not in a position to defend them directly.

It cannot be too strongly emphasized that it is not the business of ships to defend bases. This does not mean that the local defences of a particular base need be on the same scale as that afforded by the fleet which is using it, for the latter may, by its strategical position, afford protection against everything but raids. As an example of this, at Scapa Flow there was no necessity to erect ponderous land defences because the Grand Fleet was in itself the main defence.

Nevertheless, a distant base may have to stand a siege until it is relieved. Gibraltar, Malta, Minorca, and Louisburg are examples of bases which have had to defend themselves for considerable periods.

The danger of neglecting the local protection of our bases abroad is too little appreciated. It is not sufficient merely to instal powerful batteries and to provide material for local defence. Without an adequate military and naval garrison to meet the forms of attack probable, a base may fall into the enemy's hands and be turned against us, which might alter the whole strategical position and even threaten the issue of the war. Suffren's capture of Trincomali from us on August 31, 1782, and all the consequences that followed from it, is a standard example. Indeed, a base which cannot be held securely is probably better undefended, because there will then be less difficulty in turning an enemy out, should he occupy it.

## A MATTER OF SECURITY.

The defences of a base must take into account both the sea approaches and the possibilities of land attack. The security or otherwise of sea communications is a matter directly bearing on the importance of local supplies and reserves, while the dangers of assault by land must affect the size of the garrison to be maintained. With the urgent calls for economy and the heavy demands on our small Army, there is always grave objection to locking up a large number of troops in garrison duties overseas. It is necessary, therefore, to secure wherever possible the advantages of overseas bases in those Dominions and Colonies capable of providing and maintaining garrisons locally or reinforcing them instantly on the outbreak of hostilities.

In the case of a more isolated base the advantages of a small island which can be held by a garrison sufficient to man the sea defences will be apparent. It was for this reason that in years gone by we retained Malta rather than a Sicilian port. The latter would have been more convenient for operations in the Eastern Mediterranean, but would also have entailed the maintenance of a large garrison to defend it against land attack. For like reason we abandoned Tangier. A valuable feature of Gibraltar is the natural formation which from a defensive point of view gives many of the inherent advantages of an island.

### Importance of Up-keep of Naval Bases.

There is a further danger in neglecting to keep the defences of our bases up to date. This lies in the diplomatic trouble which may arise if, after long neglect, they are taken in hand. For instance, it is easy to imagine that extensive improvements to the defences of Bermuda or Jamaica might cause considerable irritability in the United States.

At the close of the nineteenth and beginning of the twentieth century some 11 million pounds were expended by Conservative and Liberal Governments on naval bases to adapt them to the needs of the fleet at that time. Some of the most important works carried out were, the extension of the mole and dockyard at Gibraltar, new breakwater at Portland, and extension of the dockyards at Keyham and Hong Kong and the construction of the naval harbour at Dover.* This expenditure under the Naval Works Act, 1895–96, was necessary to meet the requirements of a growing fleet.

Owing to the considerable alteration necessary to docks, chiefly on account of bulged ships and the re-orientation of our sea strategy, the need, after over twenty years have elapsed, again arises for expenditure on naval bases.

The scope and nature of the defences of our various bases must, of course, depend on the size and form of potential attacks and the degree to which the normal dispositions of our naval forces afford cover.

For instance, it was inconceivable in the late war that the German High Sea Fleet would have attacked Bermuda, but in the absence of cruisers working from that port, it might have been bombarded by a submarine or a raider. The defences in such a case, therefore, could be limited to those necessary to guard against the latter form of attack. On the other hand, a permanent base so situated that it will not be covered by our main fleet in its normal station, might form a tempting objective for the enemy's fleet and should therefore be defended on a very much bigger scale. These defences must include heavy batteries of long range guns, even as the strength of the sea-going fleet focuses in the main armament of the battleships. Submarines and air force will be powerful auxiliaries to the batteries, but neither are sufficiently sure and precise weapons in themselves alone.

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* Extensive dredging for the improvement of the harbour at Bermuda was to have been carried out. Money also was to be provided for surveys for docks at Jamaica and Bermuda.

### INFLUENCE OF LOCAL DEFENCES.

In addition there must be local defences of the sea-approaches against submarine attack and minelaying. These must include an anti-submarine organization, and facilities for rapidly equipping and manning auxiliary craft for minelaying and mine-sweeping. This matter of the local defence of harbours which would be needed for naval bases in war, is one in which the Dominion naval forces and India, with a reorganized Royal Indian Marine, could take a most valuable share in the whole scheme of Imperial Defence.

The anti-aircraft defences of a base should be in proportion to the scope of the air attack which an enemy could make on it, but there are practical limits to the extent to which squadrons of aircraft, which might be urgently needed elsewhere, can be locked up in a distant base for purely defensive purposes. Depending on who the enemy is, the strategic importance of a base, and its danger from air attack, may be enhanced greatly or may be negligible. Fixed anti-aircraft defences and certain permanent establishments in readiness for an expansion of the local air force are essential at all permanent bases, but in this, as in the case of defence against sea attack, economic necessity must limit the scope of anti-aircraft defences generally to such as will serve to guard the place during the period while reinforcements are being sent out.

### THE PROBLEM OF BASE RESOURCES.

C. *Resources of Naval Bases.*—The resources of a base should naturally be proportional to the class and number of warships which will use it. It is necessary, however, to further differentiate between the two main categories of primary and secondary permanent bases, already referred to. Many ports which could have been adapted to the requirements of a battle fleet before the war are now quite inadequate for modern capital ships. Not only are these vessels so long and of such great beam that existing docks will not take them, but the increased size of their armaments and propelling machinery and the multiplicity of electrical and other fittings all demand repair facilities on a far more comprehensive scale than before the late war.

These older bases can, however, accommodate light cruisers and destroyers which are numerically the predominant unit of our fleet. For convenience, therefore, the following classification may be adopted :—

(i) Primary naval bases (capable of taking capital ships).
(ii) Light cruiser naval bases.
(iii) Commercial ports at which light cruisers could be based.
(iv) Naval fuelling anchorages.

Table II. on the next page shows British ports classified under the above headings.

TABLE II.—PERMANENT NAVAL BASES CLASSIFIED.

| | (Largest ship) Docking Capacity. |
|---|---|
| (1) *Primary Naval Bases :* | |
| Home Dockyard Ports (Rosyth, Chatham, Portsmouth, Plymouth). | |
| Gibraltar. | |
| Malta. | |
| (2) *Light Cruiser Naval Bases :* | |
| Colombo | Kent |
| Hong Kong | Kent (In private docks only). |
| Sydney. | |
| Auckland. | |
| Esquimalt. | |
| Halifax. | |
| Simonstown. | |
| Bermuda. | |
| Bombay. | |
| (3) *Commercial Ports at which Light Cruisers could be based.* | |
| Calcutta | Delhi. |
| Singapore | Furious |
| Melbourne | Delhi |
| Port Chalmers | Delhi |
| Lyttelton | Cairo |
| Cape Town | Delhi |
| Durban | Kent |
| Quebec | Kent |
| St. John, N.B. | Kent |
| St. Johns, Newfoundland | Delhi |
| (4) *Naval Fuelling Anchorages :* (Protected anchorages at which oil fuel is stored.) | |
| Gibraltar. | |
| Malta. | |
| Aden. | |
| Colombo. | |
| Trincomali<br>Singapore } not yet adequately defended. | |
| Auckland—being provided now. | |
| Port Darwin—under consideration. | |
| Simonstown. | |
| Falkland Islands—not defended. | |
| Sierra Leone. | |
| Sydney—under consideration. | |

*Note.*—In the case of capital ships the "largest ship" is the largest "*bulged*" ship which can be taken.

(The Kent is the new 10,000 ton cruiser.)

In addition to these there are the commercial bunkering ports. At most of the latter stocks of oil are being built up to meet the demands of the growing number of oil-using ships in the mercantile marine. In some cases these ports are also protected naval anchorages for warships to refuel. In others they are not protected and could only be counted on for naval use if they happened to be covered by the prevailing disposition of the fleet or were so distant from the scene of hostilities that they were safe from attack.

## THE WASHINGTON AGREEMENT.

In the Naval Treaty drawn up at Washington and ratified last year by the contracting parties, the British Empire, the United States, and Japan agreed to certain restrictions with regard to the development of naval bases which might otherwise have become disturbing factors in the balance of sea-power in the Pacific.

These restrictions are to be found in the following article :—

### *Article XIX. of the Washington Agreement.*

The United States, the British Empire, and Japan agree that the *status quo* at the time of the signing of the present Treaty, with regard to fortifications and naval bases, shall be maintained in their respective territories and possessions specified hereunder :—

1. The insular possessions which the United States now holds or may hereafter acquire in the Pacific Ocean, except (*a*) those adjacent to the coast of the United States, Alaska, and the Panama Canal Zone, not including the Aleutian Islands, and (*b*) the Hawaiian Islands.
2. Hong Kong and the insular possessions which the British Empire now holds or may hereafter acquire in the Pacific Ocean, east of the meridian of 110° east longitude, except (*a*) those adjacent to the coast of Canada, (*b*) the Commonwealth of Australia and its territories, and (*c*) New Zealand.
3. The following insular territories and possessions of Japan in the Pacific Ocean, to wit ; the Kurile Islands, the Bonin Islands, Amami-Oshima, the Loochoo Islands, Formosa and the Pescadores, and any insular territories or possessions in the Pacific Ocean which Japan may hereafter acquire.

The maintenance of the *status quo* under the foregoing provisions implies that no new fortifications or naval bases shall be established in the territories and possessions specified ; that no measures shall be taken to increase the existing naval facilities for the repair and maintenance of naval forces, and that no increase shall be made in the coast defences of the territories and possessions above specified. This restriction, however, does not preclude such repair and replacement of worn out weapons and equipment as is customary in naval and military establishments in time of peace.

## GENERAL EFFECTS OF THE AGREEMENT.

The limitations were separately drawn up and defined for each of the signatories and were governed by the respective geographical conditions and naval needs of each party.

In the case of the British Empire, the western limit of 110° E. longitude was not arrived at haphazard, but was deliberately, and with the full knowledge and concurrence of the other signatories, selected so as to exclude Singapore from the *status quo* zone.

It should be noted that the sea-going force in the East are *not* limited to a *status quo*, but only by the general restrictions of the Washington Treaty as applied to size and number of ships over 10,000 tons. It is also of interest to see that the United States Navy Department proposes to spend 42 million dollars on the development of a naval base in the Hawaiian Islands, which are 3,389 miles from Yokohama and 4,762 from Manila.*

## THE NEW BALANCE OF SEA-POWER.

We have seen how the menace of an ever-increasing German Fleet caused us to concentrate the greater number of our ships, including the whole of our battle fleet, in home waters, and how the strategical situation in the North Sea during the late war called for the creation of a great naval repair and operational base at Rosyth.

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* The Hawaiian islands are 2,101 miles from the Marshall islands, 2,091 from San Francisco, 3,820 from Auckland, 4,904 from Port Darwin, 3,330 from Guam, 3,748 from Yap, 4,307 from Shanghai, 5,909 from Batavia, 4,415 from Sydney, 5,533 from Saigon, and 5,892 from Singapore.

That we were able to concentrate our available forces in one area was largely due to the Anglo-Japanese alliance, which, though it did not give us more bases, at all events gave us their equivalent. This is now dissolved, and we must now provide the actual bases in consequence.

During the war every naval dockyard in this country was working at full output, either on new construction, or refitting and repairs to the fleet or on the equipment of auxiliary craft.

With the defeat of Germany the whole naval situation in Home Waters has changed. France is the only Sea-Power of importance which confronts us in Western Europe. In the Mediterranean there are France and Italy. Lastly, there are our two potential rivals on the sea, the United States across the Atlantic, and Japan on the other side of the world.

It is clear, therefore, that a redistribution of our naval forces has become necessary.

In the course of the present year, the Atlantic Fleet in Home Waters will be reduced to four battleships, two battle cruisers and a single light cruiser squadron. The Mediterranean Fleet will be proportionately increased and the greater proportion of our seagoing Navy will be concentrated on that station, as being the strategical centre of Imperial Defence at sea.

All this has a direct bearing on the question of our naval bases. The importance of Malta, and to a lesser degree, Gibraltar, is much enhanced. The former now becomes the chief docking and repair base of the fleet in being. In order to improve the local facilities of that port a huge floating dock, capable of docking the latest capital ships, is being sent out to it.

## REDUNDANT HOME DOCKYARDS.

Lastly, we see that the number of naval dockyards in this country is now out of all proportion to the strength of the fleet in Home Waters, even allowing for the needs of new construction. In this respect the march of events points to Chatham in particular, and, to a less extent, to Portsmouth as being geographically obsolete.

Chatham is already moribund as a first-class naval repair base, because it cannot take modern capital ships. There is ample accommodation for lesser ships at the other naval ports, and in view of the urgent need to develop bases abroad, it is essential to curtail expenditure on dockyards no longer needed at home.

Another dockyard of doubtful utility is that at Pembroke. Strategically, the re-orientation of Sea Power may be said to have brought that port back into the limelight to some very slight extent, because, except for Queenstown, it is the only naval repair base on the west coast of these islands. On the other hand, it is a poor anchorage, and the small dockyard is incapable of taking capital ships, whilst Plymouth with its great facilities is just as accessible.

## RESTRICTION OF BRITISH SEA POWER.

Controversy on naval bases has unduly centred in the development of Singapore, but, important as this is, the question needs reviewing from the wider aspects outlined here.

Bases, adequately equipped and defended, are needed East, West, and Centre. That " Centre " is no longer in this country, but in the " middle sea "—the Mediterranean. But the " East " and " West " are as important.

Whilst we have on the authority of Lord St. Vincent that the provision of inert material in huge masses has a tranquillizing effect on timid minds—that acute observation does not certainly apply to the British Empire to-day, as one has only to glance at Table II., which shows that our Battle or Main Fleet is unable to remain for any period in those waters which wash the coasts of India, our dependencies in the Malay peninsula, Hong Kong, Australia, and New Zealand—solely due to there being no primary base either in the Far East or in Australia. Also for the same reason our main fleet is unable to be based on either side of Canada, the Bermudas, or West Indies.

The British Empire and the Dominions must remember that a naval base cannot be built in a day; and that in those areas of the British Empire and its Dominions where there is no base the main fleet of the British Navy will be quite inactive.

There is an ancient Chinese proverb which says, " The prudent man repairs the roof of his house before the rainy season."

C. H. N. JAMES.

# CHAPTER X.

## The Commercial Airship as a Reserve for the Navy.

In treating this subject one must first consider for what purposes the Navy would require airships, then proceed to see how the commercial airship could be utilized as a reserve to meet such of these requirements as it can be adapted for, and lastly to what extent the resources of a commercial airship service in general would be of value to the Navy in a period of national emergency.

The airship, at the present stage of aerial development, is recognized as the " weight carrier " or " long-distance aerial reconnaissance machine " par excellence, for " a large airship has a greater range of action than any mechanical appliance yet devised." Whether it is used for reconnaissance, bombing, military transport, carrying aircraft, or stores, etc., its value lies in its long-range capabilities.

Its useful load in times of peace would be devoted to carrying passengers, mails, or valuable merchandise. When so employed it would not carry its maximum load of fuel, and its endurance would therefore be less than the maximum on account of the cargo which it must carry to fulfil its commercial rôle, and make the service a paying proposition.

In war time the uses to which the weight available to be carried can be put are many and varied. It is conceivable that in certain cases its function would continue almost unaltered. Rapid communication, unhindered by the menace of submarines or mines, would, it is considered, be of even greater importance in war time than in peace. The passengers would change, pleasure seekers and business men would be replaced by officers and Imperial officials, the mails would become dispatches, the cargo might become gas masks or medical stores of a highly urgent character, and so on.

This is analogous, of course, to the subsidized ocean liner, and as the airship will, from fear of hostile aeroplane attack, probably keep as much as possible over the sea, it will fall largely to the Navy and the Air Force co-operating with the Navy, to ensure as far as possible the airship's safe passage to its destination.

### Weight-carrying Capacity.

The " tramp " airship carrying supplies of important weight or bulk is not yet visualized. The largest airships at present building or contemplated have only a gross displacement of 150 tons, and could not carry more than about 40 tons of useful stores for any distance much above 2,000 miles, depending on climatic conditions and the speed at which the voyage was made. This does not represent much in food supplies, or war-like stores in bulk, but might be of considerable value in special material for the Navy, as for example, say, torpedoes, to replace some abnormal wastage, which could not readily be made good in time by ordinary methods of transport.

The classic instance of this in the late war was the voyage of the German Zeppelin L.59 from Jamboli in Bulgaria to the Sudan, carrying medical stores for the German force under General von Lettow. Although the stores were not actually delivered, due to the capture of the landing ground, the ship went nearly there and all the way back without landing, spending four days in the air.

Since service airships will almost without doubt be adapted in the future to act as aeroplane carriers, it might appear that a use for commercial airships would lie in the direction of keeping up the supply of deck-landing machines to the fleet; but until further progress is made with this development it is hardly possible to say how far this will be practicable, as it is an open question whether the commercial airship can be readily transformed into an aeroplane carrier, or whether the carrying of aeroplanes will necessitate a special design of airship.

The question is one of some importance since, for its own protection in war time, it will be highly desirable that the commercial airship should be able to carry at least one or two fighting machines as a guard against isolated hostile aircraft attacks, such as might occur should small aeroplanes be carried in enemy surface ships disguised as neutrals, or even in hostile submarines. This should be easier to attain, however, than the definite conversion of a commercial airship into a regular aeroplane carrier.

## AIRSHIPS FOR NAVAL SCOUTING.

The conversion of the commercial airship into a long-distance aerial scout for work with the Navy is perhaps the simplest and most obvious plan of all. In place of cargo or passengers, the airship merely requires to take on board additional fuel, and with trained observers and signalmen, either as members of the Reserve among its crew or specially embarked for the purpose, it is ready for duty with the fleet. If time and circumstance permit it should carry protection against hostile aircraft as before mentioned together with some anti-aircraft armament.

Its employment will depend largely upon the nature and sphere of the naval operations. Towards the end of the last war, the southern portion of the North Sea, for example, was almost closed to surveillance by airship, on account of the development of the aeroplane and seaplane. This should not apply for many years to come to the larger oceans such as the Atlantic, Pacific, and Indian Oceans, and it is precisely over these enormous tracts of water that the airship's rôle would chiefly lie.

As regards the conversion of the commercial airship into an offensive weapon, the carrying of bombs, in place of the cargo and passengers ordinarily carried in peace time, presents no great difficulties; but the employment of these ships in assisting the Navy by attacking the enemy's naval bases, for example, is dependent on many factors which need not be gone into here. It will be sufficient to say that if airships are employed at all for this duty, it will probably be the Service airship that is used rather than the converted commercial ship.

## PROTECTION OF THE TRADE ROUTES.

Other rôles, such as long-distance convoy work, protection of trade routes against enemy submarines and raiders, searching for minefields in clear waters, and so on, will readily suggest themselves as ones which the converted commercial airship could readily undertake without any difficulty.

Given suitable conditions one might even suggest that the commercial airship might be employed as a mine-layer, but there would appear to be many technical difficulties to be overcome before this could be regarded as a promising rôle, and a considerable amount of conversion would be necessary.

It is to be anticipated that, on account of the rapid expansion which would take place on the outbreak of war, a certain number of the older commercial airships would be utilized for training Service personnel in time to take over new ships as these are built.

This was done by the Germans in the late war with successful results, and in this way their commercial airships, such as the Hansa, Sachsen, and Viktoria Luise, proved themselves to be a most valuable reserve. Since aeroplanes are now being currently employed as ambulances for the rapid conveying of sick or wounded to the nearest base hospital, no reason is seen why the commercial airship should not also be converted in time of war to a hospital airship capable of transporting a good number of cases from a fleet after a fleet action, if arrangements were made for embarking cot cases.

## THE COMMERCIAL AIRSHIP AS A GAS CARRIER.

Nothing has so far been mentioned in this chapter as to the use of helium gas (which is non-inflammable) in commercial airships, as, outside the United States of America, the production of this gas has not been developed, and its cost in England is likely to be prohibitive for some time to come; but assuming that helium is urgently required and is obtainable from America in time of war for British Service airships (or even kite balloons), an interesting use might be made of commercial airships as "helium carriers," *i.e.* by sending them to America filled with hydrogen, where they would deflate and be filled with helium for the return journey. On arrival the gas could be pumped from the carrier into the Service ship, and this would do away with the heavy cost of otherwise compressing the gas into bottles, and transporting it by sea, where it might be lost through enemy submarines.

## WAR USES OF THE AIRSHIP.

The various rôles already suggested for the commercial airship and the conversion necessary in each case will now be reviewed in a table :—

| Use of Commercial Airship as Reserve. | Modifications or Additions required. |
|---|---|
| 1. For maintaining communications. | None. Addition of means of defence. |
| 2. As training ship. | None. |
| 3. As long-distance aerial scout, including convoy work and searching for mines. | Additional petrol tanks, elimination of cabin and furniture weights. Means of defence. |
| 4. As an urgent store transport. | Elimination of unnecessary weight. Local strengthening or modification to carry stores. Means of defence. |
| 5. As an aeroplane carrier, or mine-layer. | Extensive modifications necessary which cannot be foreseen at present. |
| 6. As a hospital ship. | Means of embarking patients. Fitting up of necessary medical arrangements. Painting on red crosses. |
| 7. As a helium gas carrier. | None. Means of defence. |

As regards the airship itself, therefore, the various rôles which it might be called upon to undertake, and the amount of conversion which would be necessary in each case, have now been briefly considered.

## PROBLEMS OF MANNING.

The matter of the airship crews and airship bases will next be dealt with.

Taking first the crews, the possession of a trained airship personnel as a Reserve for the Service personnel is of obvious value. It provides, without difficulty, full crews for any ships taken over by the Navy, assuming that the members of the crew are all incorporated in a reserve force and can be called up or enrolled without delay. It also provides the nucleus of a training service for training fresh crews to replace wastage, and provides for new ships being built and commissioned.

If the commercial airships have co-operated with the Navy on occasions such as annual manœuvres in peace time, only slight changes in the composition of the crews would probably be required. Observers, signalmen, aerial gunners, and fighting-machine pilots may have to be obtained from the Fleet Air Arm, but the remainder of the crew could, for many of the suggested duties, remain unchanged.

## RAPID AIRSHIP CONSTRUCTION.

We now come to the commercial airship bases and constructional facilities. It is here that the chief value of a commercial airship service as a " Reserve for the Navy " is considered to lie. Given suitable organization and experience, the Germans have demonstrated that the airships themselves can be built very quickly. A Zeppelin took only from eight to twelve weeks to assemble in

Germany during the period when construction was being pressed in the war, and there were sufficient "slips" to turn out one ship every twelve days, or about thirty ships per annum. A shed of light construction could be erected in Germany in a little over three months. This country hardly averaged a rigid airship per slip per year during the war; but comparison is of little use, since in this country, which was the only competitor with Germany in this activity, the industry was practically non-existent at the beginning of the war, and was further subjected to a vacillating policy during the early portion of the war. Of the four "building" sheds in existence at the end of the war, each containing two berths or "slips," only one, and that of comparatively small size, was in existence at the commencement of hostilities; the three others had to be built, as approval was tardily obtained for their construction, at a time when shortage of steel and shortage of labour had already begun to make themselves felt. Their construction then took unduly long, and they were necessarily of heavier construction than the German sheds in order to withstand the gales experienced in this country.

Since our finances, for many years to come, will not permit of much money being devoted to Service airship construction, it is apparent that if a commercial airship service should develop, one of its most important features of value would be the existence of constructional sheds or "slips" which could be utilized for increased production without delay.

### Distribution of Bases.

Commercial airship bases will exist, not only in England but also along whatever routes the commercial airships ply. This will mean a few widely scattered sheds principally at terminal points and a number of intermediate mooring-mast stations scattered along the routes. These facilities should be of the utmost value to the use of airships by the Navy. When an airship comes in to be refuelled, it requires not only engine fuel, but for every ton of fuel taken on board the ship, about 35,000 cubic feet of hydrogen gas must be put into the gas-cells to lift the ton of fuel taken in.

At the commercial airship bases, supplies of cheap hydrogen would be available, and if these bases were non-existent, it would not be an easy task to improvise quickly supplies of gas to be distributed as required. An efficient gas plant takes a long time to construct and instal, and if the airship has to return to some base far away from where it is working, this naturally limits its work and reduces its effective radius of action.

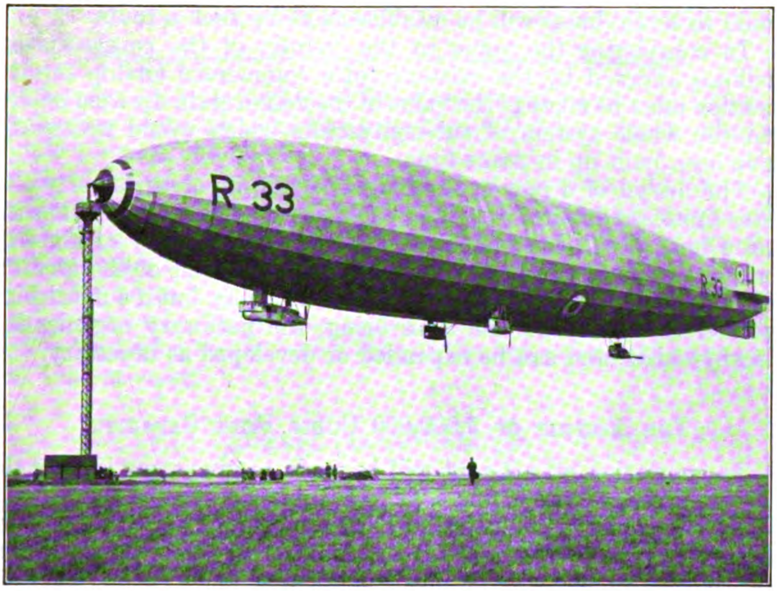
For the same reasons of finance, the number of Service sheds and mooring masts outside England is likely to be strictly limited, and it is a lesson burnt in by the war, that the efficiency of an airship service, *i.e.* the results obtained by the naval authorities from the use of this form of aircraft, depend very largely upon the efficiency and "dispersal," if it may be so called, of the ground organization.

If an airship, in distress from one cause or another, cannot get back to a base where there is either a shed or a mooring mast, that ship is generally wrecked in practice. It follows that the more bases or mooring masts there are scattered about, the better chance there is of the ship reaching one or other of them.

### THE VALUE OF THE MOORING MAST.

Should the fleet have attached to it a surface ship fitted up with mooring mast, gas plant, and carrying fuel supplies and spares, such movable base should be of the greatest value to airships co-operating with the fleet, but this alone will not altogether do away with the necessity for plenty of land bases.

Let us suppose that airships had been developed by this country before the war, and had been required to locate the German commerce raiders such as the Emden, a duty for which large rigids would have been eminently fitted. Unless bases had existed overseas from which the airships could have operated, it would have been almost impossible so to employ them.



R.33 SECURED TO A LAND MOORING MAST.

But with commercial airships running to, say, India or Australia, and having bases along the route, the matter would become comparatively simple, and the activities of these raiders would have been curtailed in a far shorter time than was actually the case. The money saved to the country would have paid for the expenditure on the commercial airship service over and over again.

### THE INFLUENCE OF WEATHER.

Then weather in many parts of the world is comparatively local. An airship hearing by wireless that the weather is bad at one place, makes for another, 300, 500, or even 1,000 miles away.

The extra distance, especially if it is a run to leeward, is nothing in comparison with having to struggle to windward against a rising wind, with the certain knowledge that the weather conditions are deteriorating at the base which is being made for, because it happens to be the only one, and there is always doubt as to whether the fuel will last out until the airship gets there or not.

In this connection it is of interest to note that the future bases for commercial airships may be found in unexpected places, and that the lines along which long-distance airships will run, may not by any means necessarily conform to the present land or sea routes. The shortest route, for example, from Europe to Japan is through the North Polar regions, and though experience is yet lacking as to whether such a route is practicable, it may be said that should it be found to be so, bases will be established along such a route.

In considering the value to the country of the constructional facilities afforded by the existence of a commercial airship service, mention must be made of the value of the design staff, drawing offices and the whole system of sub-contractors which would necessarily have been built up in peace time.

The design of a new type of rigid airship involves some two to three thousand detailed drawings, exclusive of engines and accessories, and a host of sub-contractors is involved in the supply of material for the various portions of the ship. It is a matter of the greatest difficulty to build up this organization in war time, but if a flourishing commercial airship service is in being, the necessary organization already exists, and can be expanded or developed as necessary.

## THE AIRSHIP OF 5,000,000 CUBIC FEET CAPACITY.

In conclusion, an attempt will be made to give some idea of the estimated capabilities of the 5,000,000 cubic feet, or 150-ton airship, which is the size now projected both for commercial work and for Service purposes. The figures are necessarily only approximate, and the performances given must be taken as being theoretical only until the ships have been built and tested.

APPROXIMATE DIMENSIONS OF THE AIRSHIP.

| | |
|---|---|
| Length | 700 ft. |
| Overall height | 135 ft. |
| Gross lift | 150 tons. |
| Disposable lift | 75 tons. |
| Horse-power | 3,850. |
| Full speed | 70 m.p.h. |
| Crew | 40. |

For commercial purposes, as a passenger vessel, it is estimated that this airship would carry 120 persons, 12 tons of baggage and freight, and all necessary food, water, oil, and stores (allowing 50 per cent. of fuel in excess of normal requirements), for a non-stop run of 2,300 miles at 70 m.p.h., cruising at a height of 3,000 feet.

As a war vessel, equipped with twenty tons of offensive armament, it would have, at the same height and speed, a maximum range of 4,200 miles. If the offensive armament is omitted, and the vessel used for reconnaissance purposes, the ranges would be as shown in Table I. for the various powers employed. From this table it will be seen that an airship of this type should be able to keep the air for over a fortnight, and by averaging 1,000 miles a day for 12 days, should cover 12,000 miles.

Table I.—Showing endurance of 5,000,000 C.F. Airship employed on Naval Reconnaissance Duties (*i.e.* carrying no Load except Crew of Forty and Provisions for Same) at Various Powers.

| No. of engines or power units (at full power). | Speed, m.p.h. | Max. endurance. Days. | Max. distance. Air miles. |
|---|---|---|---|
| 1 | 28·7 | 21·0 | 14,450 |
| 2 | 39·0 | 12·6 | 10,800 |
| 3 | 46·6 | 9·0 | 10,070 |
| 4 | 53·8 | 7·0 | 9,040 |
| 5 | 60·0 | 5·75 | 8,260 |
| 6 | 64·8 | 4·85 | 7,550 |
| 7 | 70·0 | 4·2 | 7,000 |

Now no point on the earth's surface is more than 12,000 miles distant from any other point, so that theoretically this airship should be able to reach any place whatever in the world in under a fortnight, or to go round the world, with one stop, in under a month.

As no cargo is carried in this case, however, the illustration is one of academic rather than practical importance at the moment, and is only cited to give some idea of the hoped-for performance of this type of vessel.

## Airship *versus* Cruiser.

If employed for naval reconnaissance duties, some idea of the estimated comparative costs of sweeping a given area (*a*) by airship of the type described, (*b*) by cruiser of the Curaçoa class is given in Table II.

Table II.—Airship *v.* Cruiser as Naval Scout.

|  | Airship. (5,000,000 c.f.) | Light Cruiser. (Curaçoa Class.) |
|---|---|---|
| Capital cost . . . . | £350,000. | £900,000. |
| Distance covered per 24 hours. | At full speed: 1,680 miles.<br>At half speed: 840 miles. | At full speed: 900 miles.<br>At half speed: 450 miles. |
| Square miles swept per hour at half speed . . | 2,000 sq. miles. | 300 sq. miles. |
| Crew. . . . . . . . | 40 | 435. |
| Cost (crew and fuel) per square mile swept at half speed . . . . | 0·3 pence. | 18·45 pence. |
| Ratio of sweeping costs . | 1 | 61·5. |

It is realized that many of the views expressed in this chapter, which it must be said are those of the writer and not necessarily "official," may be regarded as visionary, but few can deny the utility to the naval Service of a long-distance aerial vessel able to roam the vast ocean spaces for many days at a time, at such a far less cost in first construction, man-power, and running expenses than a cruiser, and for financial reasons it is chiefly to the commercial airship that one now looks to prove these contentions, and to lay down the organization which may prove to be such a useful reserve to the Navy in time of need.

Our Empire requires rapid communications to bind it together, and the opportunity is now before us to develop such a means of rapid and comfortable communication as is yet hardly realized by those who have not travelled in a large airship.

Setbacks there may be, but if the nation will not be deterred by them, results which will make the visions of to-day seem pessimistic by comparison with the accomplishments of to-morrow, will assuredly be achieved.

E. A. MASTERMAN.

# CHAPTER XI.

## A WELL-BALANCED FLEET.

THE fighting efficiency of the Navy is dependent on there being a right proportion between the several types of warships no less than on the numerical strength of ships as a whole. Each type has its own particular functions and no one type, however numerous, can fulfil the duties of a fleet, nor can it perform its own duties without the support and co-operation of other types.

If we examine these respective functions we shall see how this interdependence comes about. Starting with first principles, we find that, although new weapons have arrived to play their part in naval warfare, it is on the older arms, and on the gun in particular, that the ultimate issue must rest. Chief amongst these new weapons are the bomb, dropped from aircraft, and the torpedo fired from an aeroplane or submarine. Improvements to the long-range torpedo have tended to enhance the importance of the fast light warship. These new weapons, however, are limited in their use to sporadic and spasmodic forms of attack and the gun remains the stable form of armament both for offence and for defence.

### THE SURFACE FLEET—BATTLESHIPS.

The "great-gun" ship, to-day, is threatened by attacks from the air, and she may also be outwitted or out-manœuvred by torpedo-craft below or above water, but, because she is not impervious to each and every form of attack, it does not follow that as a type she can be dispensed with. As well might an army take the field without heavy artillery and trust to aerial bombs or sapping to counter the guns of the enemy. The right policy, obviously, is to provide the "great-gun" ship with proper defences against these sporadic and spasmodic forms of attack, so that they can be warded off before they reach her, or, should they break through the outer defences, she can still resist them successfully by her own stout ramparts. It is not necessary here to go into constructive details of armour and under-water protection, but it may be noted that forms of attack, which have been alleged to threaten the existence of the capital ship, constitute a far greater danger to less well protected ships of subsidiary types. Each of the latter has had to surrender a large measure of protection to size, speed, or special equipment, and only in the battleship do we arrive at the nearest approach to the invincible fortress, the impassable barrier, the predominant naval unit. As a class these primary units essentially function in the form of a co-ordinate group—the battle-fleet. This is the solid nucleus of our Sea Power. From it radiate the other components of the fleet, like tentacles from the main body, guarding the battle-fleet against dagger-like thrusts of torpedo, mine, or bomb, and groping for the enemy until he is brought within its clutches or prevented from eluding its influence.

### THE WASHINGTON TREATY AND BATTLE-CRUISERS.

Until limitations were imposed on the size and number of capital ships by the Washington Treaty, the most powerful tentacles of the battle-fleet were battle-cruisers. With their great speed and heavy armament, ships of this type could fight their way into sight of the enemy's main forces, "penetrating his screen until his fleet lay exposed in its weakness or its strength," or they could cut off or round up detached forces acting as raiders or as decoys. Moreover they gave added strength to the battle-line in a general engagement by acting as a fast squadron and assisting to crush in the head or crumple up the tail of the enemy's line.

An entirely different rôle which battle-cruisers may be called upon to fulfil was exemplified in the late war by the battle of the Falkland Islands. A fast enemy force, superior to our local cruiser force, had temporarily snatched from us our sea security in distant waters. Capital ships in the form of battle-cruisers were needed to restore that security. The subject is outside the scope of this article, but it is as well to recall the value of battle-cruisers in relation to commerce protection.

The size of individual capital ships (*i.e.* of ships of over 10,000 tons and armed with guns greater than 8-inch) is now limited by international agreement to 35,000 tons, and the total tonnage is also restricted. The terms of the agreement definitely precludes the repetition of a battle-cruiser combining the armament and speed of the Hood, a ship which displaces over 40,000 tons; in effect they leave little room for two types of capital ship—the battleship and the battle-cruiser. There are other reasons, too, which are combining to eliminate the latter as a distinct type.

Firstly, the aircraft carrier has arrived, and that "vision," which hitherto the Admiral could only secure by piercing the enemy's screen with a powerful cruiser force, can now, in favourable conditions of weather and visibility, be attained for him by the fleet aeroplanes. Reconnaissance in force is no longer the sole means of penetrating to within sight of the opposing battle-fleet; on the other hand, aerial reconnaissance cannot yet be relied on to an extent which would enable us to dispense altogether with cruisers so far as this duty is concerned. A further consideration is the fact that the tactical value of the battle-cruiser has become less clearly pronounced.

The record of the battle-cruisers in the fighting at Jutland shows that there is an element of weakness in the type. It is difficult, and on a limited tonnage probably impossible, to design ships with their great speed and weight of armament and yet sufficiently well armoured and protected under water to engage in a general action between capital ships. At Jutland, even the stouter-built German battle-cruisers crumpled up under the fire of the Grand Fleet battleships, while three of our battle-cruisers were sunk by the enemy's gunfire. Experience showed, too, that it is tactically unsound to press into close action ships like these, essentially designed to smash weaker vessels obstructing them in their reconnaissance duties, but only intended to engage battleships from a position of marked tactical advantage.

In view of these considerations and the fact that the total number of capital ships is limited, no Power can afford to assign a place in new construction to the battle-cruiser. When operating with the Main Fleet, existing ships of this type will, of course, continue to perform much the same duties as hitherto; but when the type is extinct their reconnaissance duties will be performed by aircraft and the fleet cruisers.

### THE AIRCRAFT CARRIERS.

Although practically untried in war the aircraft carrier is becoming a more and more important unit of the fleet. This arises from the fact that aircraft are exerting an ever-increasing influence on naval tactics and the carrier is, so far, the only means of providing an adequate force of aeroplanes when the fleet is out of range of a shore aerodrome.

The value of aircraft from a naval point of view, depends essentially on their being instantly available when and where required. It is also a practical advantage that the observers should be actually with the fleet and therefore in close touch with the situation afloat, up to the moment they go into the air. These requirements cannot be met unless the aeroplanes accompany the fleet to sea in a carrier from which they can be flown off when required.

The ships themselves will, undoubtedly, constitute an additional anxiety for the Commander-in-Chief during an action. With their huge open hangar spaces, high upper-works, and great length, they are conspicuous and vulnerable targets. The only mitigating feature is their good speed (although this is lacking in the older vessels of the class). In a fleet action they will have to be kept out of range and continually shepherded. This will be no easy matter in view of the fact that they must frequently be detached in order to turn into the wind to fly off their aeroplanes. A squadron of aircraft-carriers co-operating with each other in maintaining the necessary force in the air, is a new element likely to complicate fleet tactics to a considerable extent, but they are a type of vessel which no fleet can afford to be without in the sea battle of the future.

### FUNCTIONS OF AIRCRAFT.

The essential fleet air services are reconnaissance, observation of enemy's movements and forces during battle, and spotting for gun fire. The aeroplanes engaged on these duties will need protection from air attack. Two different types of aeroplanes—observation aeroplanes and "fighters"—are therefore necessary merely to secure "vision." At present some difficulties still attend flying heavy bombers and torpedo aeroplanes off carriers, but when these difficulties have been overcome, such types of aircraft may become important units for the offensive in a fleet action.

By the Washington Treaty we are limited in regard to the total tonnage of aircraft carriers of over 10,000 tons each. When the three big cruisers, Furious, Glorious, and Courageous, have been converted we shall only have sufficient tonnage allowance in hand to construct about one more big carrier.

These three vessels, and possibly a fourth, will make a very fine, fast Carrier Squadron, especially if augmented by the already completed though somewhat slower Eagle and Hermes. The remaining carrier, Argus, has been an admirable training ship for some years past, but is now too slow for the main fleet.

## Aircraft in Battle.

It is difficult to foretell what will be the full requirements in aircraft in a big naval battle of the future, but obviously very much must depend on the enemy's strength in the air, and this again will depend upon where the action is fought. If we have to engage the enemy within range of his land aerodromes, our seaborne aircraft may be hard put to it to hold their own. In any case it is a grave risk not to build up to our full tonnage allowance of carriers. A fleet without "air vision" engaging a fleet which possesses it, is like a blind man fighting an opponent who has the use of both his eyes. There are many aspects of this subject of too technical a character to explore here, but it is as essential to have a proper proportion of aeroplanes of the various types mentioned as it is to have a fleet well-balanced in other units.

Although, under the Washington Treaty, aircraft carriers may be armed with 8-inch guns, it will still be necessary to detail an escort of destroyers and possibly of fleet cruisers as well, in case they get isolated while flying off or "landing" their aircraft. Behind this escort, however, must be the covering force of the battle-fleet. The carrier cannot roam the ocean without an escort, the escort must be covered from superior forces by the battleship, the battleship must have "vision," so we complete the circle of interdependence.

## The Fleet Cruiser.

In the next category of types of warships comes the "fleet," or as it has hitherto been termed, the "light" cruiser. In spite of a recent official decision that the comprehensive title "cruiser" is to be used for all classes of these vessels in future, it is necessary to make rather a clear distinction between this fleet and the commerce-protecting type. The fleet cruiser is at present a comparatively small, though fast, vessel, usually working as a unit in a squadron whose duties are essentially connected with the tactics of the main fleet. In the absence of aircraft, the Commander-in-Chief is mainly dependent on his fleet cruisers for vision. We may regard these fleet cruiser squadrons as the most sensitive tentacles of the main body, to revert to our original metaphor. It is through them that the first physical touch is obtained with the enemy, but apart from this a light cruiser squadron may, by evading a concentration of enemy's cruisers or by breaking through a weak point in his screen, get within visual distance of his capital ships and thereby perform reconnaissance duties as effectually as a battle-cruiser squadron. The duties of fleet cruisers are not, however, confined to giving the battle-fleet vision, they also have definite offensive and defensive rôles. Their high speed enables them to seek a tactical position from which, with comparative impunity, they may have opportunities to use their powerful torpedo armament against the enemy's capital ships. Again, their superior gun armament and mobility makes them formidable opponents to destroyers attempting a concerted attack.

It is important to emphasize that the rôle of the fleet cruiser is not that of an escort save in so far as she may be given an assigned position relative to the main body (whether of battleships or aircraft carriers) until battle is joined, after which her utility will be directly proportional to her freedom of action either as a unit of a squadron or as a single unit, as circumstances dictate.

### LIMITATIONS OF THE FLEET CRUISER.

While the battle-fleet is dependent in great measure on the fleet cruisers for reconnaissance, screening, and anti-destroyer action, these cruisers obviously could not of themselves bring about a definite issue in an action with enemy capital ships. They can only function in the face of superior forces with the support of the battle-fleet. Their duties in relation to the aircraft carriers are, as we have seen, those of screening and protecting the bigger but more vulnerable vessels, while the aircraft of the latter may materially assist the fleet cruisers by extending their range of vision, by guiding them in the performance of their duties and, in the near future perhaps, by actively supporting them with bombs and torpedoes.

The question necessarily arises, if other Powers build 10,000-ton cruisers and use them with their main fleet, shall we not have to do the same? Two important factors must influence the answer. Will the new armament, probably 8-inch guns, of other nations' "Washington type" cruisers outrange the majority of our battle-fleet, *i.e.* will they have a maximum range exceeding 24,000 yards, and will they be faster than our existing fleet-cruiser type? Clearly we cannot lay our fleet open to a rain of 8-inch 250-lb. shell, fired at a range at which the majority of our battleships cannot reply, while our own fleet cruisers are out-gunned and out-steamed.

It is true that we are building 10,000-ton cruisers, but these are urgently needed for commerce protection duties all over the world, a responsibility which no other nation has to meet to anything like the same extent. The matter is a very serious one, for it means that we have not only got to make good the existing heavy deficit in a type of cruiser which has been largely neglected since the days of the old County Class, but we may also have to start replacing our fleet cruisers with a more powerful type of warship.

### FLEET DESTROYERS.

Destroyers employed on fleet duties must be treated as distinct from those required for local defence and the escort of shipping. Fleet destroyers have to fulfil two main functions, which may be described as *offensive* and *defensive*. In their offensive rôle they may work singly, but more generally they attack *en masse*. They may attack by day under cover of the gunfire of heavy ships, or with the aid of a smoke screen. At night darkness ensures the same essential element of surprise. Their main objective, of course, is the enemy's battle-fleet; but his aircraft carriers, in future, will be scarcely less important targets; and, for that matter, no enemy warship is beneath a destroyer's notice if opportunity arises to attack it.

Their defensive rôle may be subdivided into counter-offensive tactics, such as when flotilla engages flotilla to frustrate a torpedo attack on the battle-fleet, and escorting duties, when destroyers are acting as satellites to larger ships of the fleet to screen them against submarine or torpedo-aeroplane attack. This latter service is particularly needed when the fleet is emerging from its base, or on passage in the vicinity of, or approaching, an enemy's coasts.

In the event of a fleet action being fought in open waters and in the absence of enemy torpedo aircraft, it is questionable whether such a screen is essential, or whether the large destroyer force retained to supply it could not be put to a better tactical use by taking more aggressive action. All experience goes to show the comparatively slight danger from submarine attack of a large force of surface ships steaming at high speed on uncertain courses. Also submarines, with their restricted under-water speed, will always find it most difficult to arrive on the scene of a fleet action and get into position to attack.

### A POSSIBLE MERGING OF TYPE.

These arguments lead us to consider the possibility of merging the existing types of light cruiser and fleet destroyer. If the former has to be replaced by the 10,000-ton cruiser, it may equally be found necessary to evolve a more robust type of destroyer than that which sufficed for the North Sea. The battleship has grown in size and in future will be up to the full stature of 35,000 tons. There are strong indications that the cruiser must increase, even up to the 10,000 ton limit. The duties of the main fleet may well take it out into more distant and more open seas. The smallest seagoing unit, at present the destroyer, must be able to keep in company. Clearly we cannot incur the expense of replacing the whole of our fleet destroyers by a like number of light cruisers, but if the submarine screen can be regarded as a local defence, only needed when the fleet is in narrow waters where the existing type of destroyer can function, the enormous number of these craft which are at present regarded as indispensable to the Main Fleet might be reduced if their place is taken by a less number of more powerful and more seaworthy vessels.

The new type, it is suggested, might be a kind of glorified flotilla leader, probably on the lines of the new Japanese ship Yubari of 3,300 tons, carrying six 5·5-inch guns and a powerful torpedo armament, and having a speed of 31 knots.

## UNDER-WATER CRAFT AND AIRSHIPS.

So far we have reviewed the functions of each type of surface warship and of the aeroplanes of the main fleet, and how they must balance and counter-balance each other in order to meet its tactical requirements. There remain the submarine and the airship.

### SUBMARINES.

Submarines cannot be properly classed as a tactical unit of the main fleet for, in company with surface ships, they are more of an embarrassment than an asset. It is only on the surface that submarines can keep up, even with the battle-fleet. As surface warships they are practically useless in a fleet action. Directly they dive they become so slow and their vision is so restricted that they are liable to become as great a danger to themselves and our own fleet as they would be to the enemy.

The true rôle of the submarine is to act as an invisible outpost, reconnoitring the enemy's daily movements and his inshore positions and forces, or to lie in wait at the exits from his base, or on his known routes and to attack his warships.

Although the submarine is not really a tactical unit of the main fleet, there are grave objections to the present reduced state of the submarine service. This branch tends to suffer from being regarded as a side show, recruiting for it is poor, training is limited to a comparatively small number, the main fleet is not trained to cope with swarms of submarines as it will probably have to do in war, and the greater part of that anti-submarine organization which stood between this country and starvation in the late war, has been disbanded.

### NAVAL AIRSHIPS.

The airship, curiously enough, was years ahead of the aeroplane in performing fleet reconnaissance work. Long before the days when our aircraft carriers began to do practical work, German airships were employed in scouting for their naval forces over the North Sea. The German naval authorities have always maintained that this and not spectacular bombing raids was the airship's proper function. It is very doubtful, however, whether airships will in future be able to operate in similar circumstances to those in which Germany used them in the late war. The range and performance of aeroplanes have so much increased, and aircraft carriers have been so developed, that the airship cannot expect to remain unmolested to the extent that the German ones were. On the other hand, airships themselves will be improved both in their powers of offence and defence and may ere long carry their own satellite aeroplanes which they will release when necessary to guard them, as the destroyer screen does the battleship.

The superiority of the airship over the aeroplane lies in its greater endurance in the air and its higher carrying capacity, and its ability to hover and to economize fuel by manœuvring at a low speed and keeping station with the fleet. The fact that it does not have to be flown off a carrier or have to return to one at the end of a few hours also gives it material advantages as a fleet scout.

So far as can be seen, however, there will be little scope for airships to co-operate with the main fleet so long as the latter is within reach of strong enemy aeroplane forces: but, for long distance reconnaissance for a fleet on passage or operating in open waters, far from an enemy's air bases, and to assist in commerce protection the airship has great potentialities. It is therefore most desirable that the Navy should have opportunities for experimenting with and for developing this important side of its air arm.

## NUMERICAL STRENGTH.

The *number* of ships of each type which are necessary to complete a well-balanced fleet must be considered from two points of view:

(*a*) The minimum number of each type which must be maintained in peace time in order to carry on the tactical training of the fleet, and from which the war fleet can be readily expanded.

(*b*) The full strength which the fleet must be brought up to in war, with due regard to the strength and composition of the fleet of the enemy.

## PEACE STRENGTH.

It will simplify the problem to assume that the number of capital ships and large aircraft carriers is based on the Washington Treaty, but it should be noted that the Treaty specially legislates for a Power engaging in a war to "suspend for the period of hostilities its obligations under the . . . Treaty."

Again, for the first consideration, it will be assumed that the new distribution of units as between our Atlantic and Mediterranean fleets will for the present be the normal one. The composition of these two fleets is as tabulated on the next page.

| Class. | Mediterranean. | Atlantic. |
|---|---|---|
| Battleships . . . . . . . | 8* | 5 |
| Battle-cruisers . . . . . | Nil. | 2* |
| Aircraft carriers . . . . | 2 | 1 |
| Light cruisers . . . . . | 11 | 5 |
| Destroyers . . . . . . . | 36 | 45† |
| Submarines . . . . . . . | 7 | 7 |

NOTE.—The Washington Treaty allows Great Britain to have twenty-two capital ships until the Nelson and Rodney are built. This number is made up by four battleships in reserve and one battle-cruiser acting as firing ship for gunnery training. When the two new battleships are completed, four of the older ones are due to be scrapped.

It requires no length of argument to show that the new Atlantic fleet is not well balanced for tactical training. For example, its battleship strength is so weak that such an essential manœuvre as deploying into line of battle cannot be performed realistically. The two battle-cruisers scarcely constitute a squadron for manœuvring purposes, and the solitary aircraft carrier and single light cruiser squadron do not provide scope for very practical reconnaissance work or screening exercises. Compared with other units the proportion of destroyers in the Altantic fleet appears to be more adequate, but, speaking generally, this fleet, when working alone, must be regarded as primarily one for training the *personnel* in the use of weapons rather than for developing naval tactics.

## THE MEDITERRANEAN FLEET.

The principal fleet is now that belonging to the Mediterranean command. The eight battleships belonging to it are a minimum number with which proper tactical exercises can be carried out, and even these must be somewhat limited. It is probably an advantage that the composition of this fleet is not complicated by battle-cruisers. The two aircraft carriers, Eagle and Hermes, permit of elementary practices with fleet aircraft, but the situation will be much improved when the more homogeneous Furious, Courageous, and Glorious are ready. They could then release the Eagle and Hermes to join the Atlantic, while the Argus would be available for foreign service.

The eleven light cruisers and thirty-six destroyers provide a fairly useful little force for exercising fleet reconnaissances, screening, torpedo attack, and counter-attack.

The seven submarines attached to each of the Atlantic and Mediterranean fleets provide a small nucleus of this class for exercising simple schemes of reconnoitring and attacks on the fleet, although two of the Mediterranean flotilla are really submarine-monitors armed with a 12-inch gun each, and therefore more suitable for bombarding operations than for fleet work.

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* Not including one battleship or battle-cruiser refitting.

† Eighteen have reduced crews.

## The Main Fleet—Peace and War.

Broadly speaking, however, not even the Mediterranean fleet can be regarded as a really well-balanced one for tactical training in all its branches. Such a fleet is only produced when the Mediterranean ships are joined by the Atlantic ones. The twelve battleships and a fleet flagship will then constitute an adequate force for exercising battle tactics on a full scale. In due course, perhaps, the battle-cruisers will go further afield and cease to be regarded as essentially belonging to the Main Fleet. The combined aircraft-carrier squadron may, in time, muster five ships. It would appear to be a better arrangement that the sixteen light cruisers should be formed into four squadrons of four ships.

When the two fleets are thus combined for tactical training, the Atlantic fleet destroyers with reduced crews should be brought up to full complements, giving eighty of this class, a number which will then be in keeping with the strength of the other units of the fleet.

It will be of interest to compare this combined fleet and the relative strength of its various types of ships with the Grand Fleet and High Sea Fleet at the battle of Jutland :

| Class. | Mediterranean and Atlantic, 1924-25. | Grand Fleet 1916. | German High-Sea Fleet, 1916. |
|---|---|---|---|
| Battleships . . . . . . | 13* | 29 | 22 |
| Battle-cruisers . . . . . | 2* | 9 | 5 |
| Cruisers . . . . . . . | Nil | 8 | Nil |
| Fleet (light) cruisers . . . . | 16† | 23‡ | 9§ |
| Aircraft carriers . . . . . | 3* | 1‖ | Nil |
| Destroyers . . . . . . | 81 | 78 | 72 |
| Airships . . . . . . . | Nil | Nil | 10¶ |

This comparison shows a slight improvement in the relative number of fleet cruisers to battleships as compared with the Grand Fleet, even crediting the latter with the Defence class, which were assigned somewhat similar duties. The reduction, both actual and relative, in battle-cruiser strength is to some extent balanced by the addition of aircraft carriers. The lessons of Jutland showed the great value of light craft both for offence and defence. The added menace of torpedo-carrying aircraft has tended further to enhance their utility ; hence we find a marked increase of destroyer strength in the modern fleet. This, as has been said, may have to be somewhat reduced if we take to building a new type of larger vessel to replace the existing fleet destroyers.

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* In future years to consist of twelve 15-inch or 16-inch gun battleships, plus four 13·5-inch battleships in reserve, and five aircraft carriers ; battle-cruisers may go elsewhere.

† Also one fleet cruiser with Admiral (D) and one with Commodore (D).

‡ Also three acting as destroyer leaders.

§ Also two acting as destroyer leaders.

‖ Seaplane carrier only (no landing deck).

¶ The German airships took no part in the Jutland battle but performed valuable reconnaissance duties next morning.

The German High Sea Fleet, it will be noticed, was extraordinarily weak in light cruisers. This may well account for the way in which it blundered into the Grand Fleet at the outset of the main action, and again, at a later stage, when the first attempt was made to break back to port. On the other hand, their large force of destroyers was undoubtedly a very great asset and materially assisted to save the capital ships from annihilation.

Although no airships are likely to be permanently allocated to our main fleet in the immediate future, it is to be hoped that as soon as the experimental ones are completed one at least will be sent to gain and give experience when the Atlantic and Mediterranean fleets unite for tactical exercises. The Navy of the future will be a "sea and air" Navy, and it behoves us to introduce the air element into the composition of our fleet and the training of its *personnel* to the utmost extent which the advance of science permits.

## War Strength.

No one can, in peace time, lay down arbitrarily the war strength of the fleet. As we saw in the last war, much depends on the way in which the sea contest develops. Extensive submarine activities call for a huge anti-submarine organization. Air warfare on a great scale, such as might develop in a war with a Continental Power, might relegate sea warfare to a secondary place. War with a distant Sea Power, on the other hand, might preclude aerial warfare save that which could be waged by the fleet's air arm, and we might have to concentrate our whole efforts on measures to protect our seaborne commerce.

It is necessary, however, to realize the trend of events abroad, and the following table shows the probable composition and numerical strength of the main fleets of the other four chief Sea Powers by the end of 1925 :—

| | U.S.A. | Japan. | France. | Italy. |
|---|---|---|---|---|
| Battleships | 18 | 6 | 9 | 7 |
| Battle-cruisers | Nil | 4 | Nil | Nil |
| Aircraft carriers | 1 | 1 | 1 | 1 |
| Cruisers<br>Light cruisers | 32 | 26 | 19 | 14 |
| Destroyers | 295 | 115 | 73 | 67 |
| Submarines | 126 | 54 | 55 | 43 |
| Airships | 14 | 2 | 9 | 1 |

### Notes.

*U.S.A.*

(i) Aircraft carrier is a converted fleet collier.

(ii) Number of airships uncertain.

*Japan.*

The total fleet is given ; all ships may not be in full commission.

*France.*

The total fleet is given except ships permanently detached for foreign stations.

*Italy.*

(i) The total fleet is given, as for France.

(ii) Battleship figure includes two pre-Dreadnoughts.

We cannot, of course, draw comparisons between the figures in the above table and those in the table on p. 138, showing the composition of the combined Mediterranean and Atlantic fleets. In war time the latter would be augmented by ships in Reserve, and these would bring our quota of capital ships to that allowed by the Washington Treaty. In the matter of cruisers, however, the numbers shown in the table of foreign navies represent the approximate strength which their main fleets could be brought up to in ships of that type. As against this we could not appreciably add to our sixteen fleet cruisers without withdrawing ships from foreign stations already gravely short of cruisers. There can be no doubt, therefore, that for war we want many more cruisers than we have got or than our present building programme will provide.

The disparity in our submarine strength as compared with that of the principal foreign navies, even taking into consideration our effective reserves, must also be noted. A large replacement programme of destroyers is rapidly becoming necessary if we are not to fall behind in this class, too.

A fleet, well-balanced and sufficiently strong in all its units, cannot be created by a stroke of the pen when an emergency arises. War requirements must be kept steadily in view as each year's building programme is made out. Certain auxiliary units may be extemporised, as they were in the last war, but the main fleet in all its essential types must be available at the very outset of hostilities if our continued existence as an empire is to be secure.

## A Well-balanced Command.

In reviewing the needs of a well-balanced fleet it will not be out of place to touch on the subject of commands. Unless the various commands are well ordered and co-ordinated under a supreme command afloat, the fact that the types and classes of ships which compose the fleet are well-balanced will not of itself produce efficiency in war.

There are strong reasons for maintaining the two separate Atlantic and Mediterranean fleets; one very practical reason is the limitation to the capacity of Malta as a base. Nevertheless, as we have seen, it is only when the two fleets are combined that they make a really well-balanced force. This argues the necessity for vesting the supreme command afloat in one, not two, Commanders-in-Chief. The existing policy of two entirely separate commands, tends to produce different systems of training, different doctrines in matters of tactics and even of strategy, and different standards of efficiency. Such matters cannot be satisfactorily co-ordinated in the Admiralty offices, and in the day of battle it will be of vital importance that the combined fleet should at once come under the Commander-in-Chief in whom the command has centred and who has inspired its preparation for war in times of peace.

The same principle should hold in subordinate commands. In action, the battle-fleet will probably continue to operate under the personal direction of the Commander-in-Chief, but the aircraft carriers will have to be organized as a separate squadron. In view of the immense amount of experience yet to be acquired in this nature of fleet work it is eminently desirable that these ships should be grouped under a Flag command without delay. It would seem a little incongruous if a Flag officer continues to command two battle-cruisers and there is none to command five aircraft carriers.

Fleet cruisers are already organized in squadrons, with a Rear-Admiral in command of each, and the Commander-in-Chief is probably the best person to co-ordinate cruiser work. The fleet destroyers are divided into a Mediterranean command under a Rear-Admiral (D) and an Atlantic fleet command under a Commodore (D). Here again it would seem better that an Admiral (D) should be responsible to the supreme Command afloat for *all* destroyer work and training, just as the Admiral (A) would be responsible for naval air work and the Admiral (S) for submarines.

These proposals would in no way preclude the independent exercises of separate battleship divisions and other group formations for the greater part of the year, but they would ensure co-ordination of training in peace and a well-balanced system of command for war.

EDWARD ALTHAM.

# CHAPTER XII.

## THE NAVAL CAREER

WITHIN the decade which has elapsed since the outbreak of the Great War, changes of far-reaching importance have been made in the conditions of entry, education, pay, professional training, and promotion of naval officers. These changes are of such a nature that it has been thought desirable to review their effect upon the Service in a separate chapter of the "Annual." Those who are sufficiently interested in this important subject will be able to trace the successive steps in the progress achieved by a reference to past issues of this volume, wherein, under the chapter on "The British Navy," the changes made year by year are recorded. It is, however, only when the whole field of administration in this respect is reviewed, and a comparison of the conditions which now obtain is made with those formerly existing, that a true idea can be obtained of the trend of progress. Only within the past year, the increase of the number of special entry cadetships to 40 per annum, as compared with about 15 per annum which were thought to be sufficient in March 1920, indicates the ever-changing circumstances confronting those responsible for the administration of our naval personnel.

### AVENUES TO THE QUARTER-DECK.

There are now half a dozen methods by which commissioned officers, both for the deck and engineer departments, may be entered, viz., (1) As cadets through Dartmouth College; (2) as special entry cadets; (3) by early selection from lower-deck ratings via the grades of Mate and Mate (E.); (4) by seaman youths volunteering to sit for the examination for special entry cadets, and by the selection of artificer apprentices to undergo training as Midshipmen (E.): (5) by promotion of warrant officers, in later years, after meritorious service; and (6) by special advancement of lower-deck ratings or warrant officers for distinguished conduct or gallantry. With one exception, the lists of commissioned officers at the present time contain representatives of each of these channels of advancement.

The exception, which may be dealt with first, is that of the scheme announced by Lord Lee of Fareham, then First Lord, in his memorandum dated March 12, 1921, for the selection of promising lads from the boy artificer training establishment in H.M.S. Fisgard, who had specially distinguished themselves during their course of training, to proceed with Dartmouth cadets who were going in for engineering to the Royal Naval College at Keyham, there to be trained as Midshipmen (E.). There has not yet been time for such an arrangement to produce any commissioned officers. The first candidate to benefit by it is Mr. H. B. Samways, who, after training as an artificer apprentice, was selected in January 1924 for appointment as a Midshipman (E.), and is now undergoing the course at the Engineering College at Keyham. The number of officers taken from this source is to be " very limited," but, as Lord Lee remarked, it will be possible for these boys, on their merits, to reach the higher ranks in H.M. Service. Considering the undoubted advantages of such a scheme, there ought to be great keenness shown by the apprentices in regard to it. Given a lad with sufficient intelligence to pass the Civil Service competitive examination for boy artificers, and of zeal above the average, his parents may be relieved of the heavy outlay involved in putting the boy into Dartmouth, and yet see him reach a position of honour and distinction equal to that of the cadets from the latter College. An artificer apprentice enters between 15 and 16 years of age, is provided with a free outfit, berthed and victualled at the public expense, and receives pay of from 1*s.* to 2*s.* 6*d.* a day according to the length of his training. Remembering that some of the higher posts at the Admiralty and the Dockyards have been reserved for future engineer officers, there could not be a more democratic system than this, which throws open such positions to a lad of humble parentage. The concession may also be regarded as a fitting recognition of the splendid work done in connection with the training of boy artificers within the Navy during the past twenty years.

### Dartmouth and Keyham Training.

As regards the methods (1) and (2) in the list mentioned, it is to be observed that, amid all the changes rendered necessary by experience of the Selborne-Fisher system introduced in 1903, the principle of common entry, and common education as cadets, is retained. Boys enter the Royal Naval College at Dartmouth at about 13½ years of age, for both the deck and engineering branches, and receive identical training during their four-year course. The age is a year higher than that originally fixed, and there have been suggestions to increase it still further. But the adherence to 13½ years is based on the fact that at this age most boys are finishing their private school education, and thus they go to Dartmouth instead of to a public school. More attention is now paid to general education at the Naval College, the large amount of time formerly devoted to engineering having been reduced.

An important change made during the past year has been the abolition of the training ship in which the cadets, on leaving Dartmouth, have been sent to sea for two terms, or eight months in all, to gain an acquaintance with sea life and to fit them for being drafted to ships as midshipmen. Economy appears to have been the chief motive for the decision to pay off the Thunderer, which was announced in the First Lord's Memorandum of March 10, 1924, but it is directly contrary to the experience of the last twenty years or more. In 1868–73, naval cadets had one year in the Britannia and one year at sea in the frigates Bristol or Ariadne. The plan then fell into abeyance until 1902, when first the Isis, and, later, the Aurora, were commissioned to take fourth term cadets from the Britannia to sea for training. Lord Selborne, then First Lord, wrote in his Memorandum that not only was this sea time in no way detrimental to their studies, but the practical instruction made them already fit to perform midshipmen's duties on joining the Fleet. In 1907, the Cornwall and Cumberland were fitted to embark cadets from Dartmouth, and were so employed until war broke out; while in 1913 the Highflyer was similarly adapted for special entry cadets. Since the war, the battleships Temeraire and Thunderer successively, and the cruisers Cumberland and Carnarvon, have been so employed. It can readily be understood that the much smaller number of cadets—the estimated average for 1924–25 being 490, as compared with an estimated average for 1914–15 of 893—makes the cost of maintaining a battleship for their sea training proportionately heavy, and it is difficult to find a smaller vessel corresponding to the "County" cruisers, the last of which, the Devonshire, was towed away from Plymouth for breaking up in November 1923. Since being paid off as a seagoing ship, the Thunderer has continued to be associated with cadets' training by being utilized for the instruction of special entry cadets and of paymaster cadets, in harbour at Devonport, these having formerly been trained in the Courageous at Portsmouth.

## TRAINING ON SHORE AND AFLOAT.

On completing their cadet training, the young officers from Dartmouth, though remaining in the military branch, are divided into the deck and engineering corps. No longer do they serve together as midshipmen and sub-lieutenants. Those on the deck side go to sea, as formerly, but the candidates for engineering, it is now held, require a thorough grounding in engineering and electricity, and a period of practical work in the shops. Consequently, they go to Keyham College for a course lasting three years and eight months, and then for a term to the Vernon Torpedo School. For a selected few, there is a further advanced course of two years at Greenwich, and officers who pass this, if qualified by seniority, will be confirmed in the rank of lieutenant. A significant feature, now that the training ship is abolished, is that, probably for the first time in the history of the Navy, there will be a certain category of lieutenants in the military branch who have never been to sea. Their ten years' service will all have been performed in shore colleges and establishments at Dartmouth, Keyham, Portsmouth, and Greenwich—for even the Vernon has been, since October 1, 1923, housed on shore. Herein lies the most marked contrast between the conditions of to-day and those of the original scheme of common entry. Before the war, the system was for the engineers, in common with future specialists for other branches, to serve at sea until after they had become lieutenants, at about twenty-three years of age. Now the system is for them to remain on shore until that age, and not to go afloat until they are fully trained.

At the present moment, two schemes of training for engineer officers from Dartmouth are in operation. Under the older system, the course of training for lieutenants (E.) lasts from May until August of the following year, the officers joining as lieutenants or sub-lieutenants on the expiration of a six months' preliminary scientific course at Greenwich. Under the new system, the training starts with the midshipmen immediately they leave Dartmouth, as already explained. In announcing the preliminary engineering examination afloat for officers desiring to specialize under the old system, to be held on March 26, 1924, the Admiralty called attention to the fact that this was the last examination of the kind, and that no further opportunity would be afforded to acting sub-lieutenants of seniority up to and including January 15, 1924 (except special entry officers who entered in September 1920) for specializing in engineering. In January 1924 the Admiralty also published details of the intermediate examination of officers under the new scheme. This test is held after two years and four months as midshipmen, and those who show that they have made satisfactory progress, and are capable of continuing the course with advantage, are advanced to acting sub-lieutenants. The examination therefore corresponds to that afloat in seamanship for officers of the deck branch. The first class of the new scheme midshipmen (E.) is of seniority of January 8, 1922.

## Special Entry Cadets.

Very significant, in connection with recent progress in regard to naval education, has been the greater use made of the special entry of cadets from the public schools. Started in 1913 as a temporary measure to supplement the supply of officers owing to the large expansion of the Fleet, this method has become a recognized part of our system of entry. In his memorandum of March 12, 1920, the late Lord Long, referring to the decision to continue it, so that boys who are not ready to enter at the age of 13½ may still have an opportunity to do so by a Civil Service competitive examination at 18, said that "about 15 special entry cadets will be taken under existing circumstances annually." These cadets, having already received a general education, undergo one year's training in a harbour ship. After this, they become midshipmen, and fall into line with those from Dartmouth, being trained thereafter in exactly the same way.

As the terms which had been passing out from Dartmouth were smaller in numbers than usual, it was announced by the Admiralty on March 26, 1924, that the number of special entry cadetships offered for competition in June 1924 would be increased to 40, and an important modification of the entrance conditions was also made. Twenty of these cadetships were allotted in the deck branch, and twenty on the engineering side, each candidate being required to declare the class of cadetship he wished to obtain. Engineering or deck cadetships were awarded in accordance with the order of merit published by the Civil Service Commissioners and the wishes of the candidates, subject to the proviso that a successful candidate among the first thirty in the order of merit was granted a deck cadetship if this had been his declared choice or first preference.

Manifestly, the necessity for a declaration of this character, before entry, and the large proportion of engineering cadetships offered, could only have come about by a scarcity of candidates for the branch from the main source of supply. This scarcity was certainly accentuated, if not caused, by the withdrawal of the opportunity for engineers to revert to deck duties later in their careers. No doubt this closing of the door to the chance of command was inevitable, and forced upon the authorities by hard experience; nevertheless, its effect upon the supply of candidates for the branch was bound to be disappointing. Some of the smartest lads at the Naval Colleges before the war have been known to say, "We love engineering and would rather be engineers than anything else, but we do want to command our own ships and our own fleets." The future officer is not to have it both ways. If his bent is towards engineering, and he adopts that department of the Service, he must keep to it for the rest of his career. But at least it may be said that he is in a much better position than before common entry was established, for not only will he have had a good general education, and a sound technical training, but he will enjoy the status of executive rank and command over his men, and will be able to look forward to high administrative posts at the Admiralty and the dockyards which were not open to his predecessor. It is even possible that in the near future a seat at the Board may be open to him.

The increase of special entry cadetships to forty—practically as many as in a Dartmouth term—raised afresh the question of which of the two methods of entry is the better from the naval standpoint. Under war conditions, it must be admitted, the special entry cadets showed to great advantage. They came into the Navy after attaining some position of responsibility in a public school, had practically completed their general education, could be trained more quickly and at less cost to the State, were stronger and better at games, and had a broader outlook on life. In short, although not possessing the technical knowledge of the Dartmouth cadets, they had all the makings of good officers, especially as in most cases they had been accustomed to discipline, by service in the O.T.C. at their school. Yet the experience of many generations is that cadets should enter as early as possible to get accustomed to naval routine and imbibe the sea tradition, and to-day the increased professional knowledge demanded of the naval officer makes it highly desirable that there should be ample time for his education. There is scope for both systems under present conditions.

### ADVANCEMENT FROM LOWER DECK.

Turning now to the third method of entry to the commissioned executive ranks, via the grades of Mate and Mate (E.), it is to be noted that the officers obtained from this source are not only actually, but also relatively, much fewer than in 1914. There appear to have been no promotions to Mate in 1919, 10 in 1920, 4 in 1921, 6 in 1922, and 6 in 1923. This total of 26 in five years compares with 44 promoted in 1913, and 31 in 1914. There were 61 Mates on the list when war began, and the number rose during hostilities to 178, excluding several who had by that time been promoted to lieutenant. From this figure to the 12 officers now holding the rank is a big drop. The reasons for it are various, but at least it must be said that the reduction is not entirely the fault of the Admiralty. Although obliged to make the necessary tests very severe, the Board have simplified the path to the quarter-deck by this channel in two ways since the war. In 1920, as it was found that the majority of men promoted in this manner did not reach the rank of lieutenant until 28–29 years of age, or even later, it was decided to abolish the rule that candidates must have seven years' service. A man on reaching the age of 21, provided he had qualified, was made eligible for advancement to acting mate, so that it would be possible for him to become a lieutenant at about the same age that a special entry cadet could reach that rank. Further, on December 21, 1923, in order to give fuller opportunity for obtaining promotion to acting mate at an early age, the Admiralty decided to remove the restriction that candidates must have actually obtained at least a leading rate.

There would appear to be something in the view that the majority of the seamen who are keen to do well in the Navy prefer the more gradual advance to commissioned rank by means of the warrant grades to the big jump by means of the Mate scheme, which would land them in the wardroom at such an early stage of their careers. Probably also the heavy retrenchment among the older mates which was made in the 1922 reductions has had an adverse effect upon volunteers. No less than 139 lieutenants (ex-mates) between 30 and 39 years of age were removed at this time, and such a large displacement of men at what might be called the prime of their careers, when they were beginning to look forward to the prospect of commander's rank, which Mr. Churchill held out to them in 1912, was bound to have its influence. Actually, of course, this drastic cut was all in favour of the future mates, by removing surpluses and restoring the normal flow of promotion.

In the engineering branch, more advantage is taken of this avenue of promotion to commissioned rank, although possibly the greater proportion of vacancies has something to do with this. The numbers of Mates (E.) advanced since the war have been, 1919, 10; 1920, 6; 1921, 7; 1922, 6; and 1923, 5; a total of 34. Bearing in mind that there are nearly twice as many seamen as stokers and artificers—the actual numbers on January 15, 1924, were 32,701 seamen, 2,387 signalmen, and 2,610 telegraphists, as compared with 16,641 stokers, 267 mechanicians, and 3,608 engine-room artificers—it will be seen that the proportion of commissions granted to the engineer ratings has been nearly three times as much. The ratio since the war has been one commission for every 603 stokers or artificers, but only one for every 1,449 seamen and other executives. The acting Mates (E.) formerly received a course of six months' instruction at the Royal Naval Engineering College, Keyham. This course is now carried out at Greenwich. The subsequent service of Mates (E.), like that of the Mates, has been very creditable. One of them, Engineer-Lieutenant A. F. Dellbridge, R.N., passed the Advanced Course in Engineering at the Royal Naval College, Greenwich, in July 1924, thus becoming entitled to the (E†) qualification.

### FROM SHOTLEY TO THE GUNROOM.

The fourth channel by which commissioned rank in the executive branch of the Navy may be attained is not generally used. It is, however, quite possible for lads who join through the training establishments at Shotley and Devonport, to take the examination for special entry cadets. The age limits for boy seamen to enter are now 15¼ to 16¾ years. Special entry cadets are taken not under 17½ nor over 18½ years. Everything turns, therefore, upon whether the boys would be able, during their two years or so in the training establishments, to prepare themselves for passing the Civil Service examination. Their chances are manifestly not so good as those of the boy artificers in the Fisgard, who try for one of the posts as midshipmen (E.). Yet the transition has been known. At least once during the war, a Shotley boy, serving as an able seaman in the Renown, went in for a special entry cadetship, and, helped by the officers of the ship, succeeded in passing. He became a midshipman after the usual twelve months' training, and in due course was promoted to lieutenant. If it should happen that there is less response than is expected to the offer of promotion by means of the grade of mate, the authorities might do worse than consider the adoption of a regular scheme by which one or two special entry cadetships were reserved each year for seaman boys under training. The advantage of this, in comparison with the mate scheme, would be that the transfer from the lower deck to the quarter-deck would be made at about the age of 18 instead of 21 or over, and these three or more valuable and impressionable years might mean a great deal to a budding and zealous young officer. His training as a midshipman would be progressive and continuous, whereas on the lower deck it might not be so, from the standpoint of an officer's education. Moreover, while as a mate he would be required to put in two years or more sea service at about the age of 21–23, as a sub-lieutenant of the same age he would spend a good deal of time in studying at Greenwich and Portsmouth in the shore courses which have now taken the place of that formerly held for officers of this rank at Cambridge.

### THE COLLEGE COURSES.

This brings us to a consideration of the greater amount of time spent by sub-lieutenants in the shore training establishments. Herein lies a rather marked contrast to the programme adopted for the cadets from Dartmouth before the war. These young officers spent about five years after leaving the College continuously at sea. Shore courses did not begin until a lieutenant's commission had been obtained, somewhere between the age of twenty-two and twenty-three. This was a change which had long been called for, as it was contended that to keep young officers of about twenty years of age in the neighbourhood of Greenwich or the naval ports was less to their advantage than to send them to sea, postponing their shore studies until later. On the other hand, it is now argued that, for officers who have already had several years of naval discipline, to come ashore at the lower age is not really a great disadvantage. Were the matter considered only from the standpoint of the welfare of the officers, shore courses might be done away with; but as in other aspects, modifications of the original scheme have been rendered necessary by the experience gained. This was fully anticipated and provided for when the Selborne-Fisher system was inaugurated, as was frequently explained at the time. Indeed, no other policy was possible, since the Boards of Admiralty associated with the scheme in its early stages could not bind their successors to any particular line of action in the absence of actual experience.

An illustration of the working of the present system may be given in the case of the officers who were promoted to acting sub-lieutenant on May 15, 1924. They were advanced after two years and four months as midshipmen (instead of three years as before the war), and whereas they would under the older plan have gone back to sea for at least another two years, they entered upon the following programme of shore studies:—on June 16, they were ordered to begin the divisional, physical training, and submarine courses at the Royal Naval Barracks, Portsmouth; on September 25, the six months' course at Greenwich; on April 27, 1925, they will begin three months' gunnery training at Portsmouth, where from July 20 to September 4, 1925, they will be engaged in torpedo instruction, and from the latter date until October 16, 1925, in the Navigation School. As these officers entered as cadets at Osborne in September 1917, they will by the autumn of 1925 have had eight years in the Service, of which less than three will have been passed afloat, and five on shore. This is the reverse of the order planned by the original promoters of the common entry system. It should be noted that this comparison refers to all officers of the executive branch, except the engineers. The large proportion who elect to specialize in gunnery, torpedo, navigation, etc., have still to come ashore again in the near future to undergo their respective long courses.

### THE SELBORNE-FISHER SCHEME.

It is of interest to record the present stage of progress of the original group of cadets who entered under the common entry scheme. The number of candidates interviewed by the committee in 1903 was 278. Of this total 75 joined Osborne College, 64 of whom passed on to Dartmouth. The number who passed out of the Cumberland and became Midshipmen in 1907 was 56, of whom 54 presented themselves for the examinations for lieutenant three years later. Eight volunteered for engineering, and were appointed to Greenwich for the course beginning on October 1, 1913. Then came the war, and by February 1920, when the first two Osborne cadets were promoted to lieutenant-commander, the number in the group had dropped to 35, including 6 (E.) officers. Four years later, the number in the group had dropped to 31, including 5 (E.) officers. None of the cadets in the first group became Marine officers, nor did any in the second group. Indeed, the only Osborne-trained officers who appear to have gone into the Royal Marines are Captains R. G. Sturges and C. H. Congden, who were still serving in 1924. These officers were in the third and fourth groups respectively to enter Osborne, in May and September 1904. Certain officers in the first group joined the Royal Air Force, of whom two—Wing-Commander C. H. K. Edmonds and Wing-Commander J. T. Babington—continued to serve after the war. Two others who selected engineering actually combined the charge of engines and the command of their vessels during the war.

### POST-GRADUATE INSTRUCTION.

Dealing with the later training of officers in the executive branch, it may certainly be said that never was this so complete and thorough on its academical or theoretical side. Over seven pages of the enlarged Navy List are occupied with the names of officers undergoing various courses of instruction, of which nearly six contain the names of executive officers. These courses have been described in successive issues of the "Annual," and therefore need not be recapitulated here, but as will be seen from a reference to the Navy List, they range from the War Staff course at Greenwich to the Periscope course at Portland, and from the long courses in gunnery, torpedo, navigation, etc., at Portsmouth to the Gyro Compass course at Langley Observatory. The effect of all this technical training is manifestly beneficial to fleet efficiency.

The naval career, therefore, is not only open to new classes of candidates, as compared with the period preceding the war, but much greater facilities are given to an officer to keep himself abreast of the advances in his profession. On the other hand, he requires to be exceptionally keen to rise to the higher ranks, the competition for promotion being much more severe. With 398 commanders on the list, there were 9 promotions to captain in January 1924, and 10 in July 1924. With 439 on the list, there were 20 such promotions in January 1914, and a similar number in July. Out of 718 lieutenant-commanders on the list, 19 were advanced to commander in January 1924. Ten years earlier, out of 751 lieutenant-commanders on the list, 41 were advanced to commander. The vacancies, therefore, have diminished by one-half, but not so the number of candidates for them. One feature of recent naval progress which has a bearing on this perennial problem of advancement, with its manifold ramifications, is the restriction of battleship building. In a fleet composed largely of light cruisers, the number of appointments for captains in relation to those for lieutenants and lieutenant-commanders is much increased in comparison with a fleet composed of battleships of the later types. In recent years, the increase in size and power of battleships has obliged additions to their complements, and whereas the Exmouth, of 1904, had but eight lieutenants, the Hood, of 1924, has sixteen, of whom two are for (E.) duties. But in both types of vessel, only one captain and one executive officer is needed.

Higher up the scale a similar state of things is brought about by the reductions in the fleets, which have led to the numbers of flag officers being reduced. The full measure of retrenchment decided upon over two years ago, of 15 officers—2 admirals, 3 vice-admirals, and 10 rear-admirals—has not yet been achieved, and until it is, there is a curtailment of the flow of promotion from the captains' list. Indeed, it may almost be said that the maintenance of a reasonable flow of promotion to flag rank just now and in the immediate future is largely, if not chiefly, dependent upon the patriotism of those admirals who, with little or no prospect of further employment before them, retire at their own request in order to facilitate the promotion of their juniors.

## ENGINEER OFFICERS' ADVANCEMENTS.

Turning now to the engineers, it may be well to indicate how far the transition from the old scheme to the new has gone. The last engineer officers entered directly through Keyham College attained the rank of engineer lieutenant-commander in 1920. The regulations governing the promotion of engineer-lieutenants to this rank were altered by a fleet order dated January 5, 1923, and such officers are now promoted automatically on attaining eight years' seniority as engineer-lieutenants. The 200 or more engineer-lieutenants now on the active list are those who have been advanced from the grades of commissioned engineer and warrant engineer (formerly known as chief artificer engineer and artificer engineer respectively); or from commissioned mechanician and warrant mechanician (that is, officers promoted by meritorious service from the stoker branch); or through the scheme of selection from the lower deck through the rank of Mate (E.), already mentioned. As regards the progress of the Selborne-Fisher scheme, the first of the Osborne-trained engineers attained the rank of lieutenant-commander (E.) on June 30, 1920. For the first time, in fixing the half-yearly zones of promotion to engineer-captain and engineer-commander on October 26, 1923, the Admiralty included lieutenant-commanders (E.) in the promotion zone for advancement in this branch. Thus, although the new lieutenant-commanders (E.) are borne on the same list as other lieutenant-commanders, they are considered with the engineers only, and do not rank with other officers of the military branch for advancement. Here it may be recalled that the method of advancement is now practically the same in all branches, that is, by half-yearly selection for promotion to the relative ranks of captain and commander. This similarity of treatment followed naturally upon the grant of military titles to all branches in October 1918, for which reform the Service was chiefly indebted to Lord Wester Wemyss.

In addition to the advanced course at Greenwich for a limited number of lieutenants (E.), there are now special courses in various engineering subjects for senior engineer officers. At Portsmouth, they undergo instruction in oil fuel, turbines, and internal combustion engines, a counterpart, as it were, to the technical course for senior officers in the executive department of the military branch. There has also been instituted a short course for senior engineer officers at Greenwich, the first of which began on April 10, 1924, when an engineer rear-admiral, four engineer-captains, and four engineer-commanders were appointed for it. On March 28, 1924, also, the Admiralty announced the institution of a short course in electrical engineering to enable those engineer officers provisionally selected for subsequent appointment to repair ships to take charge of the electrical repair staff and work in addition to their former duties. This course consists of two months in the Vernon, for a descriptive study of ships' electrical equipments ; and a similar period in the dockyards and contractors' works for a study of repair methods and appliances. It is ultimately the intention of the Admiralty to transfer responsibility for the electrical installations of all ships from the charge of the torpedo lieutenant to the engineer officer.

## THE NAVAL INSTRUCTORS BRANCH.

Perhaps the most striking change brought about by the new titles is seen in the naval instructor branch. Until August 9, 1917, officers in this department had but the one title of "naval instructor." Two of them were then made "chief naval instructors," a designation which to the uninitiated might have suggested a chief petty officer, instead of a commissioned officer of about thirty years' service. But in October 1918 these two officers became instructor-captains ; naval instructors of 15 years' seniority were made instructor-commanders ; those of from 8 to 15 years, instructor lieutenant-commanders ; and those of less than 8 years, instructor-lieutenants. The number of instructor-captains has since been increased to 4, and the number of commissioned officers on the active list in 1924 is 74, as compared with 55 in 1914. In addition, whereas there were only 4 chief schoolmasters and 33 head schoolmasters in 1914, now there are 23 senior masters and schoolmasters (commissioned officers from warrant rank), and 122 schoolmasters (warrant rank), apart from the schoolmaster candidates. Since 1920, the officers of the Instructor branch have been responsible to the captain for all scholastic instruction of officers and men on board ship. Their pay has been considerably improved, and they have been granted actual instead of relative rank, being on the same footing in regard to rank and command as officers in the other non-military branches.

### DENTISTS AND SURGEONS.

There is less outward and visible change to be noted in the medical branch, but one important difference as compared with 1914 is the creation of a separate dental branch. Formerly the dental surgeons employed in the Navy were civilians attached to the respective barracks, hospitals, and training establishments. The then civilian dental surgeon at the Royal Naval Barracks, Devonport, is now Surgeon-Commander (D.) Edward E. Fletcher, O.B.E., Assistant to the Medical Director-General, and there are about 47 other officers now on the active list of this branch. The importance of dental fitness is frequently impressed upon all officers and men, and in addition to the improved facilities for obtaining dental treatment, arrangements exist for such treatment, where no naval dental officer is available, at Army and Air Force dental centres, as well as by civilian dentists.

Candidates for the dental branch are taken between 21 and 28 years of age, after an examination lasting four days held in London, and are commissioned as Acting Surgeon-Lieutenants (D.), being confirmed in the rank after a month's course at Haslar. They receive 2*s*. a day less than surgeon-lieutenants of the medical branch, viz. 22*s*. a day, instead of 24*s*.; and 27*s*. after three years, instead of 29*s*. If qualified medically they are, nevertheless, paid on the dental officers' scale, unless appointed for medical duties in addition to their dental work. There is also a scheme for temporary service in the dental branch, whereby surgeon-lieutenants (D.) are taken for eighteen months, with the option of continuing for further periods of six months should their services be still required. They are paid 24*s*. a day, with a gratuity on discharge of £10 for each complete month of service.

In the medical branch proper, officers enter between 21 and 28 years of age, as Acting Surgeon-Lieutenants, and must obtain at least 50 per cent. of marks in each subject of the examination held at the conclusion of their courses at Greenwich Medical School and Haslar Hospital. There are much more elaborate arrangements now than formerly for the post-graduate instruction of medical officers, including a five months' course prior to advancement to surgeon-commander, and a three months' course at Greenwich for senior officers. Qualified doctors not over thirty are also accepted for temporary service of three years, with the option of a fourth year if needed.

### PAYMASTERS' PROSPECTS IMPROVED.

The most numerous changes among the non-combatant branches have been those among the paymasters, the prospects of which class of officers have been materially improved. Although the report of the Napier-Halsey Committee on this branch, which was made in the spring of 1920, has never been published, it is understood that several of the changes since made were either recommended or inspired by that body. Paymaster cadets enter between 17 and 18 years of age, receiving 4*s*. a day, and after three years become paymaster sub-lieutenants at 10*s*. a day, being promoted two years later to paymaster-lieutenants. The much greater scope for their employment in the present Navy is illustrated in various ways. There is a separate department of the Paymaster Director-General at the Admiralty, and the Director-General himself has the rank of paymaster rear-admiral. No doubt, in view of the strength of the branch, the number of posts to be filled by officers of flag rank will be increased in time, and a paymaster rear-admiral will be allotted to each of the home ports to co-ordinate the work of his branch, in the same way that an engineer rear-admiral is borne on the staffs of the port commanders-in-chief. A step in this direction was taken on April 3, 1924, when it was announced that three paymaster-captains had been appointed at Portsmouth, Chatham, and Devonport as Port Accountant officers on the staffs of the commanders-in-chief. It is also to be noted that the practice, instituted as a war measure, of the Admiralty Lords appointing their secretaries from the accountant branch instead of from the Civil Service has been continued, thus adding to the opportunities afforded to the paymasters for acquiring inside knowledge of the system of naval administration in which they are called upon to play so large a part.

### SECRETARIES' BRANCH

Since the last issue of the "Annual," changes have been made in the designations of officers serving as secretaries, with the object of indicating more clearly the nature of the duties performed in each case, and of discontinuing the use of the term "Clerk" as applied to accountant officers so employed. The Secretary to a Flag Officer is now called Admiral's Secretary, irrespective of the rank or appointment held by the Flag Officer. The Secretary to a Commodore, first or second class, is styled Commodore's Secretary, irrespective of the appointment held by the Commodore. The accountant officer formerly known as Clerk to the Senior Officer of a Division of a Naval Station, not being a Flag Officer or Commodore, has become, whilst so employed, Senior Officer's Secretary. Also, the term of Assistant Secretary has been introduced for the senior accountant officer employed in an office where the Secretary has the status of a Secretary to a Commander-in-Chief. At the same time that these changes were made in January 1924, the titles of ratings in the writer branch were changed—Third Writer to Writer; Second Writer to Leading Writer; First Writer to Petty Officer Writer; and Chief Writer to C.P.O. Writer. This brought the titles of the writers' branch into line with those of ratings in other branches.

In common with all other classes of ratings, it is possible for the writers to rise to commissioned grade, with the relative rank of lieutenant, after long and meritorious service. There are fifteen branches of lower-deck ratings who now enjoy the prospect of advancement to lieutenant through the medium of the warrant ranks. Remembering that it was only in 1903 that Lord Fisher made a start in this direction by promoting a proportion of officers from the lists of chief gunners, chief boatswains, chief signal boatswains, and chief carpenters to the rank of lieutenant, the extension of the plan has been remarkable. Gunners and boatswains now rise to lieutenant; signal boatswains to signal lieutenant; telegraphists to telegraphist lieutenant; masters-at-arms (for whom the title of "regulating branch" has superseded the objectionable term of "ships' police") to lieutenant-at-arms; shipwrights (formerly carpenters) to shipwright lieutenant; artificers and mechanicians to engineer-lieutenant; ordnance artificers to ordnance lieutenant; torpedo artificers to ordnance lieutenant (T.); electricians to electrical lieutenant; sick berth rating to wardmaster lieutenant; writers to paymaster lieutenant; supply ratings to paymaster lieutenant (S.); and cookery ratings to lieutenant instructor in cookery.

## PAY AND EMPLOYMENT.

The improvements in the pay of naval officers made since the war, coupled with the decrease of the amount of unemployment and consequently of time on half-pay, have unquestionably brought about a great amelioration in the conditions of service. The pay was practically doubled in 1919, up to which time it had remained stationary for many years; no change had been made owing to the continued rise in prices during the war. Since 1919, although no change has been made except the 5½ per cent. reduction of 1924, on the basis of the cost of living, officers have sustained reductions of their emoluments in other ways. The children's allowance has been abolished. Victualling allowance, provision allowance, and similar payments have been reduced every six months on the ground of lower food prices. Table money has been brought down to pre-war rates. Income tax, which during and immediately after the war was levied at a lower rate for those in the fighting Services, has now to be paid at the full civil rate, and in addition, lodging allowance has recently been made subject to income tax. Allowing for all these factors, however, the naval officer is in a more advantageous position financially than he was before the war.

There are more opportunities now than formerly for naval officers to add to their pay by qualifying for extra allowances, the proportion of specialists having largely increased. The Jerram-Halsey Committee of 1919 aimed at simplifying the pay tables by doing away with several allowances and absorbing them in the basic rates. It will be seen, however, that numerous allowances remain, and in addition to those formerly paid to navigating, gunnery, torpedo and similar specialist officers, there are now allowances for War Staff, anti-submarine, wireless, and other duties. From 2*s.* to 6*s.* a day submarine allowance is payable to those employed in these craft; naval officers trained and detailed as air observers draw 4*s.* or 6*s.* a day extra; and there is a special duty rate, known as Admiralty allowance, for officers appointed for service inside the Admiralty.

The increased amount of employment, coupled with the institution of unemployed pay and of more liberal rates of half-pay, has removed a very real grievance of the old Navy. Even some of the most successful officers in their profession were compelled to spend years at a stretch on what was not really "half-pay" at all—lieutenants, for instance, being allowed only 4*s*. a day in some cases. There is now no half-pay for sub-lieutenants, except for misconduct or at their own request, while lieutenants and above, up to flag officers, if waiting employment and willing to serve, receive unemployed pay which, except in the case of captains, amounts to the same as their full pay for the first six calendar months. As has almost always been the case in the matter of employment, deck officers are not, on the whole, so fortunate as those in other departments. The introduction of the various courses of instruction, during which officers receive full pay, has been an advantage in this connection, and certainly the folly of allowing officers to rust on shore for long periods is now appreciated in a manner which affords a great contrast to the practice of a generation or two ago. Sir Edmund Fremantle records in his autobiography how he volunteered to join the Royal Naval College at Portsmouth in the 'sixties, as a half-pay commander, and was allowed rooms in the College and 1*s*. 6*d*. a day towards mess money, but "at that time half-pay officers were rather appointed as a favour than encouraged to go to the College." Nowadays such instruction has a regular place in every officer's career, and is arranged for at the Admiralty.

## INFLUENCE OF PAY ON MARRIAGE.

It has been said that the better pay of the naval officer has led to an increase in the number of early marriages. Whether or not this is to the advantage or otherwise of the officers themselves, it raises afresh the question whether the authorities ought not to provide free or assisted passages to enable wives to join their husbands on foreign stations, as is done for officers in the other Services. The increase in the amount of foreign cruising as compared with the period immediately preceding the war is an added attraction to the Service at present, since it enables officers, instead of spending so much time in and around the North Sea, to visit countries and ports which were formerly denied them. It would be a great boon if this larger measure of foreign service could be faced without the disadvantages which it at present entails in the case of married officers who are unable to arrange passages for their wives or children. A request that indulgence passages should be granted to wives and families of officers serving abroad was made by the Jerram-Halsey Committee in 1919, but was not approved by the Government of the day.

The heavy reductions in the Navy since 1919 have largely increased the non-effective lists, as they are called, and it is a good thing from the standpoint of the welfare and reputation of the Service that the conditions of officers on the retired and reserved lists have been much improved. A commendable step was the appointment in May 1924 of a committee to consider the matter of the retired pay withheld from officers who were recalled for service in the war. The sense of injustice resulting from this illegal act led to the formation in January 1920 of an Association of Retired Naval Officers, who took steps to bring the matter before Parliament. Mr. Lloyd George, then Prime Minister, received a deputation on the subject in June 1922, and said that, if the claim was legal, then the country must pay. But the Crown cannot be sued for " wages," and therefore redress had to be sought in other ways. The Committee under Mr. Holman Gregory, K.C., of which the other members were Sir Cyril Jackson, K.B.E., Sir Leo Chiozza Money, Mr. A. Emil Davies, and Lieutenant W. A. Rhind, M.B.E., R.N., published their report on August 15. They were unable to reach agreement upon principle. The Chairman, Sir Cyril Jackson, and Lieutenant Rhind found that the practice of suspending retired pay or pension during active service was reasonable, and that in all the circumstances the retired naval or marine officers re-employed in the war were adequately remunerated. On the other hand, Sir Leo Money and Mr. Emil Davies thought that the grievance felt by the officers could and should be remedied, and recommended that the retired pay which was suspended should be paid, less certain amounts.

## PAY ADJUSTMENTS IN 1924.

On March 28, 1924, the Admiralty gave the first indication of the extent to which officers' pay was to be reduced on July 1, 1924, in accordance with the arrangement made when the scales of pay, retired pay, etc., were introduced in 1919. It was then provided that 20 per cent. of these rates was to be regarded as due to the increased cost of living, and to be subject, after five years, to change either upwards or downwards, according as the cost of living rose or fell. It was rather curious that at the time when this revision became due, the index figure showed a tendency to rise, and there was the curious spectacle that while the naval officer was being notified of cuts in his pay, the civil servant was also being notified of additions to his emoluments. In the former case, the fall in the cost of living was assigned as the reason ; in the latter, the increase in the cost was cited. This was due to the fact that there had been a fall since the last naval pay rates were fixed in 1919 ; whereas the civil service bonus had been changed every six months, and prices had risen since the last half-yearly review. The effect of this and other differences in treatment, however, was unfortunate, especially as little confidence appeared to be placed in the method by which the official cost of living figure was arrived at. Doubtless it was the expectation of the Jerram-Halsey Committee in 1919 that by 1924 the fall in prices would have been sufficient to justify taking off the whole of the 20 per cent. due to the cost of living, so that the rest of the pay could have been stabilized permanently. Instead of this, the Government announced that a reduction of approximately 5½ per cent. would take place on July 1. A further review will therefore become necessary three years from this date. The reduction did not affect the pay of ratings, whose rates were fixed in 1919 without any condition similar to that attaching to the increase of officers' pay. There were rumours afloat early in that year that Mr. Baldwin's Government concurred in the findings of the Anderson Committee, referred to at length in the last issue of the "Annual," that the ratings' pay was too high, and that even the 1914 scale was not too low. The Admiralty caused it to be known, however, that the whole of their evidence before the Anderson Committee was to the effect that they considered the 1914 pay was quite inadequate. The Admiralty have always held and expressed this view. In the end, no action was taken along the line suggested by the Anderson Committee, and it would have been a gracious act towards a deserving class of State servants if the pay of officers had likewise been left untouched.

### RETIRED PAY AFFECTED.

In addition to the rates of full pay the 5½ per cent. reduction also applied to certain non-effective emoluments, including the retired pay of officers who left the active list since 1919. This was in accordance with the conditions under which these officers accepted retirement under the special schemes. Those who had retired before the war, and were not recalled for service therein, were of course unaffected by the 5½ per cent. reduction, as with the exception of certain cases which came within the scope of the Pensions (Increase) Act, 1920, no additions to their pensions or retired pay had been granted them. From April 1924, the rates of pay, whether full pay, half-pay, retired pay, and allowances, and also pensions, with the regulations governing their issue, have been published separately as an appendix to the Navy List, and may be obtained from H.M. Stationery Office, or through any bookseller, for 1*s.* 6*d.* net.

### IMPROVED PROSPECTS.

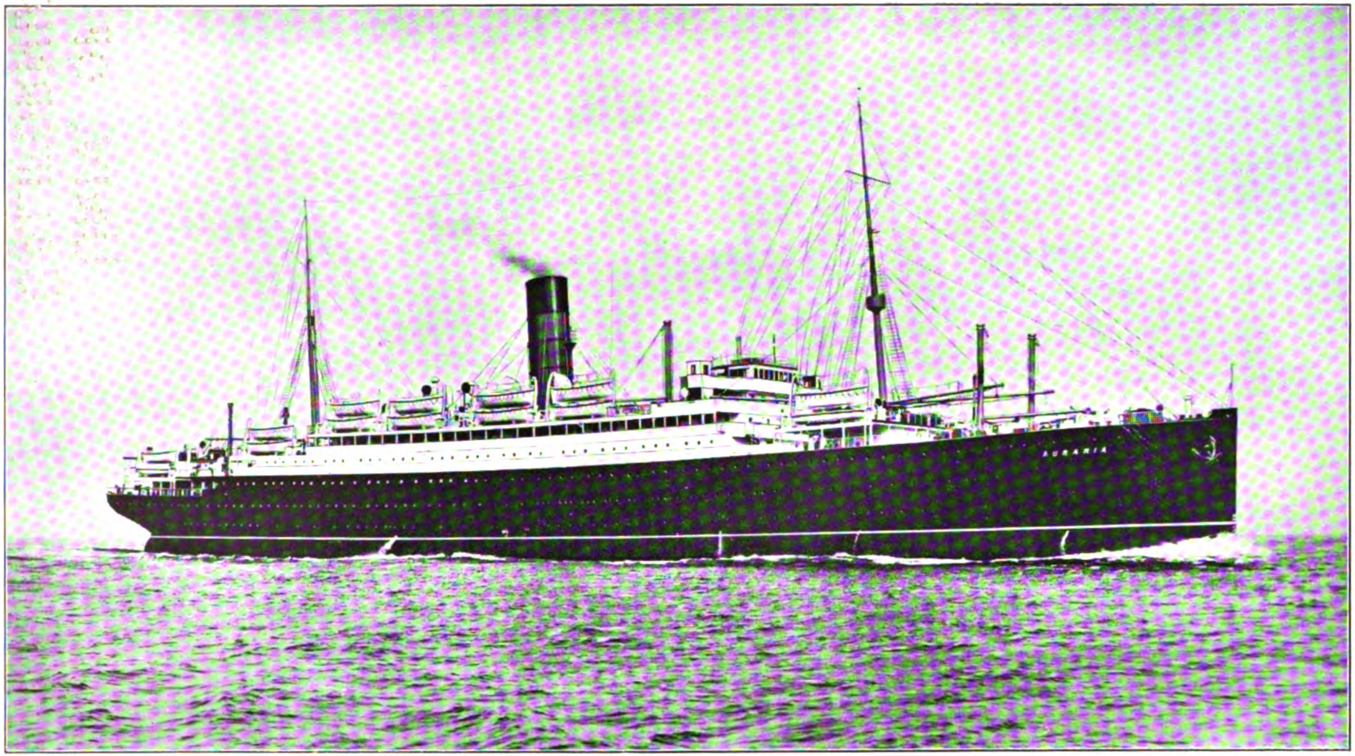
In general, the prospects of those entering the commissioned ranks of the Navy at the present time are distinctly good, and much better than before the war. Although in the years immediately preceding the struggle there was an increased demand for junior officers, so that resort had to be made to special entry cadetships, the transfer of supplementary lieutenants from the Mercantile Marine, and the promotion of mates from the lower deck, this only served to broaden the base of the tree without a proportionate addition to its higher branches, so that although it was easier to get into the Service it was certainly not easier to make progress in it. To-day, conditions approximate more to the normal. Although further conferences for the restriction of fleets are talked about, the time is not opportune nor the conditions ripe for such negotiations, and all history shows that after a decline in strength such as marked the years 1919–22, the tendency is to build up again. In this movement, there will be enlarged scope for the zeal and talents of naval officers.

In the last Navy Estimates, it will have been noted that provision was made for 473 more flag and commissioned officers, and 55 more naval cadets, than in the previous year, and Lord Chelmsford stated in his memorandum that these and other additions to personnel did not include any in respect of the 5 cruisers and 2 destroyers to be commenced under the new Estimates. If these are to be additional to the existing Fleet, more officers will be needed for them. As it has also been decided that the Fleet is to have its own air arm, a further addition has been made to the already numerous channels in which naval officers of to-day are employed.

Perhaps the salient feature of a review of the present situation in regard to the entry, training, and prospects of naval officers is the way in which the Admiralty have thrown open every chance for the boy of spirit and ability. There is no lad of the right sort who cannot now aspire to become an officer of his Majesty's Navy. With the restriction in the number of entries after the war, it might well have been otherwise, but the Board, on the other hand, have actually increased the opportunities for entry and advancement. Dartmouth College remains the principal avenue of entry for a naval officer, and the education it provides is second to none; but for parents of limited means there are the other methods touched upon in this article, apart from the fact that for every lower deck rating, whatever his department, the ladder of promotion runs clear to the wardroom. Certainly to those who desire an honourable career, healthy, full of variety and interest, and with a competence for life as the reward of good service, there is no profession that offers more attractions than the Navy of to-day.

CHAS. N. ROBINSON.

# MERCHANT SHIPPING SECTION.



CUNARD LINER AURANIA.

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# CHAPTER I.

## THE WORLD'S MERCANTILE MARINE.

THE world of to-day presents the curious picture of a beginners' class in economics, the pupils being the politicians who obtained their experience in the uneconomic days of the war. By repeated applications of the rod of necessity, and with much unnecessary suffering, the lesson is painfully being enforced on humanity that economic laws are as immutable as the ocean, and that political control can no more evade or divert them than Canute could keep back the tide. Particularly is this true in the case of shipping, which has so largely become an international industry; there are certain fundamental axioms which govern sea transport, and which can only be disregarded at the cost, in the long run, of severe penalties. Shipping may be defined as an internationally-marketable commodity, brought into existence in response to demand, and dependent upon that demand for its price and maintenance. Arrest the supply of shipping by war or storm, and inevitably new ships must come into existence to meet the demand; disturb the course of international trading, and equally inevitably will the demand for shipping dwindle and die.

It is for this cause that the shipping community is slowly realizing that the great mistakes of the Allies during and after the late war rank parallel with Germany's war policy in consequences, if not in brutality. The policy which permitted the unequalled financial resources of Great Britain to be exploited and pillaged for the benefit of less fortunate but more unscrupulous Allies; the stupendous shipbuilding programme undertaken by the United States and driven to its colossal climax long after its sentimental justification had vanished; the materialistic venom which dictated the Ruhr campaign; to these are the post-war troubles of the shipping and shipbuilding industries due at least as much as to Germany's methods of submarine warfare—which, as is well-known, came within measurable distance of success, and at all events had the merit of being logical.

Shipping is an international commodity, largely if not entirely independent of national political aspirations. The contribution which any particular country makes towards the total must be dependent on its economic development, and its standing in foreign markets. Until a country is driven by necessity into trading overseas, until easy avenues for the employment of capital are no longer to be found in internal industry—and in general the rewards for adventure overseas are appreciably less than for corresponding efforts on land—that country's share in the world's mercantile marine must be small, and will remain so in spite of artificial stimulants, which ultimately bring nothing but reaction.

These are no idle statements; their proof is patent before us to-day. Germany sank our shipping? It was replaced, because it was needed. America sought to build up a huge merchant fleet, in spite of her undeveloped resources? It lies, a rotting battalion, four-deep down the length of the James River. The Allies at Versailles impounded Germany's merchant fleet, lock, stock and barrel, in spite of her need to trade overseas? Already she has three-fifths of her old amount of tonnage, but this time a modern fleet, a good half being under five years old.

If, then, a country's merchant fleet is to be determined by her economic position, it will be desirable to glance at the changes which have taken place in the various maritime countries since pre-war days.

## I.—ECONOMIC POSITION IN THE MARITIME COUNTRIES.

In last year's "Annual" reference was made to the dependence of wholesale prices upon transport facilities, and a table was given which attempted to present a picture of the changes which have taken place in the general level of wholesale prices in some of the principal maritime countries, on an approximately comparative basis. It has now been possible to extend that table to include all countries owning above a million gross tons of merchant shipping, and to examine more closely the usefulness and limitations of the statistics.

Table I. is compiled from the wholesale price indexes of the various countries shown, converted so that they have a common base of 100 in 1913, and corrected by the average exchange rates for each year as compared with the par value, in order to take account of the great variations in the purchasing power of currency which have taken place as the result of the war. For all ordinary purposes it may be said that the table represents the price in pounds sterling which would have to be paid for a given quantity of general goods in any of the countries shown, if the said quantity of goods cost £100 in the United Kingdom in 1913.

Anyone who has had to deal with prices during the period of disturbed currency, will at once realize the advantages of such a system of correction. Before the war, when the gold standard was in operation, it might be claimed that an approximate comparison was possible between the various wholesale price indexes, if converted to a common base year. This was so because the various currencies had a gold basis, and when the rate of exchange fell below a certain point, the cost of freighting bullion overseas would still leave a profit on the transaction—gold was therefore shipped, and the exchange automatically restored. The rate of exchange therefore rarely varied far from parity, although, as a matter of fact, most currencies maintained a level slightly below par as compared with the pound sterling, owing to Britain's pre-eminent financial position; this is

TABLE I.—THE YEARLY AVERAGE COURSE OF WHOLESALE PRICES IN VARIOUS COUNTRIES.

(Corrected for changes in the value of currency as compared with the English sovereign, *i.e.* prices expressed in pounds sterling.)

| Year. | Great Britain. | United States. | Denmark. | France. | Germany. | Holland. | Italy. | Japan. | Norway. | Spain. | Sweden. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1895 | 73·3 | 68·4 | — | 72·9 | 70·3 | — | 70·9 | — | — | — | — |
| 1900 | 87·9 | 79·8 | — | 82·3 | 86·0 | — | 74·3 | 75·2 | — | — | — |
| 1905 | 84·5 | 85·9 | — | 85·2 | 80·1 | — | 82·2 | 87·2 | — | — | — |
| 1910 | 92·3 | 96·9 | — | 92·9 | 88·8 | — | 86·5 | 90·4 | — | — | — |
| 1913 | 100·0 | 99·9 | 97·8 | 99·8 | 99·8 | 99·9 | 98·1 | 99·4 | 99·7 | 92·9 | 99·6 |
| 1914 | 100·0 | 97·8 | 131·1 | 102·1 | 105·8 | 109·2 | 94·9 | 94·2 | 113·1 | 96·0 | 99·1 |
| 1915 | 127·1 | 103·6 | 153·2 | 133·2 | — | 151·1 | 116·4 | 96·8 | 163·2 | 120·5 | 113·8 |
| 1916 | 159·5 | 128·8 | 223·2 | 169·2 | — | 239·9 | 161·3 | 120·4 | 255·8 | 168·2 | 173·3 |
| 1917 | 206·1 | 180·8 | 315·1 | 241·5 | — | 295·9 | 217·7 | 154·4 | 406·8 | 199·0 | 229·7 |
| 1918 | 226·5 | 198·0 | 337·3 | 319·9 | — | 443·9 | 278·0 | 206·1 | 408·7 | 264·3 | 317·6 |
| 1919 | 241·9 | 226·4 | 328·9 | 282·5 | 80·9 * | 327·7 | 239·2 | 263·0 | 330·3 | 233·3 | 329·1 |
| 1920 | 295·3 | 300·1 | 273·9 | 243·5 | 142·7 | 330·2 | 208·5 | 333·8 | 316·0 | 239·2 | 366·2 |
| 1921 | 182·4 | 185·8 | 149·4 | 167·4 | 122·3 | 192·4 | 160·0 | 242·5 | 209·8 | 167·2 | 233·9 |
| 1922 | 154·1 | 163·8 | 155·2 | 151·0 | 341·8 | 168·9 | 150·1 | 206·3 | 157·5 | 154·7 | 185·6 |
| 1923 | 152·9 | 163·9 | 153·1 | 140·4 | 132·3 | 156·4 | 146·0 | 206·2 | 161·6 | 138·4 | 171·6 |
| 1924 § | 162·0 | 171·4 | 155·1 | 138·4 | 129·9 | 164·8 | 145·9 | 213·1 † | 149·7 | 134·2 ‡ | 179·9 |

* Last four months only. † January only. ‡ January and February only.

§ First three months only, except where otherwise stated.

shown, for instance, in the figures in Table I. for the year 1913, where the departures from the figure of 100 for the United Kingdom are solely due to the correcting factor derived from the exchange rates.

### BASIS OF ECONOMIC COMPARISON.

But though it might be approximately correct in pre-war days to compare wholesale price indexes directly, yet to compare, for example, the index figure of 162 for the United Kingdom during the first three months of 1924 with the figure of 118,067,000,000,000 for Germany for the same period, would be meaningless—hence the value of the exchange rate corrective.

On the other hand, it must be remembered that at best the comparison of wholesale price indexes, even when corrected in this manner, cannot be more than approximate. The indexes themselves are calculated in different ways; some are "weighted" to allow for the amount of trade done in the various commodities, some are not; some are calculated from a large number of different articles, some from a few. The exchange rates used—the average of the monthly means between maxima and minima—cannot be said to represent truly the course of currency transactions, since they obviously cannot be associated with the volume of business transacted, and hence a high rate may be due to a very few dealings during a temporary tightness of money. Moreover, it is to be admitted that in every country imported articles will figure in the wholesale price index, and that the price of such articles must, to some extent, be governed by the international value of each country's currency. The currency corrective used in this table will therefore probably have a somewhat greater effect than should be the case.

Notwithstanding these criticisms, the table does provide a means by which to show the broad comparison between country and country, and it will be of interest to show what the present position is in the other maritime countries, when compared with a figure of 100 for the United Kingdom:—

| Country. | Corrected Wholesale Price Index for the first three months of 1924 |
|---|---|
| United Kingdom | 100·0 |
| United States | 105·8 |
| Denmark | 95·7 |
| France | 85·5 |
| Germany | 80·2 |
| Holland | 101·7 |
| Italy | 90·1 |
| Japan | 131·6 * |
| Norway | 92·4 |
| Spain | 82·8 † |
| Sweden | 111·0 |

It was observed in last year's "Annual" that there was a strong tendency to return to the pre-war stability as between one country and another. The experience of the past year confirms this view,

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* January only.

† First two months only.

and there is some ground for arguing that the general level of prices will be maintained at 160 to 170 per cent. above the pre-war level for some years to come.

### The Fleet in Existence.

Having observed the approximate variations which have taken place in the economic position of the various maritime countries, it will be well to see how far such changes have affected the distribution of the world's available supply of tonnage. Table II. shows the amount of seagoing steel and iron steam and motor tonnage owned by the principal maritime countries of the world, both before and since the war :—

Table II.—Seagoing Steel and Iron Steam and Motor Tonnage owned by the Principal Maritime Countries.*

(Thousands of gross tons, *i.e.* 000's omitted.)

(Note.—Sailing vessels are not shown as there are now only 2½ million tons, or about 4 per cent. of the total owned in the world.)

| Country. | As at June, 1914. | As at June, 1921. | As at June, 1922. | As at June, 1923. | As at June, 1924. |
|---|---|---|---|---|---|
| United Kingdom . . . . | 18,877 | 19,283 | 19,053 | 19,077 | 18,917 |
| British Dominions . . . . | 1,407 | 1,950 | 2,201 | 2,219 | 2,214 |
| British Empire . . . . . . | 20,284 | 21,238 | 21,254 | 21,296 | 21,131 |
| America (United States) . . | 1,837 | 12,314 | 12,506 | 12,467 | 11.823 |
| Austria-Hungary . . . . . . | 1,052 | Nil. | Nil. | Nil. | Nil. |
| Denmark . . . . . . . . | 768 | 866 | 944 | 920 | 974 |
| France . . . . . . . . . | 1,918 | 3,046 | 3,303 | 3,265 | 3,193 |
| Germany . . . . . . . . | 5,098 | 654 | 1,783 | 2,496 | 2,856 |
| Greece . . . . . . . . . | 820 | 576 | 653 | 743 | 751 |
| Holland . . . . . . . . | 1,471 | 2,207 | 2,613 | 2,606 | 2,533 |
| Italy . . . . . . . . . | 1,428 | 2,378 | 2,600 | 2,788 | 2,676 |
| Japan . . . . . . . . . | 1,642 | 3,063 | 3,325 | 3,402 | 3,655 |
| Norway . . . . . . . . | 1,923 | 2,285 | 2,337 | 2,299 | 2,326 |
| Spain . . . . . . . . . | 883 | 1,094 | 1,187 | 1,169 | 1,163 |
| Sweden . . . . . . . . | 992 | 1,037 | 996 | 1,092 | 1,146 |
| Other Countries . . . . . | 2,398 | 3,459 | 3,301 | 3,396 | 3,303 |
| Total Abroad . . | 22,230 | 32,979 | 35,548 | 36,643 | 36,399 |
| World's Total . . | 42,514 | 54,217 | 56,802 | 57,939 | 57,530 |

It will be observed that for the first time since the war there has been a decrease in the amount of tonnage owned in the world. Indeed, except for a drop of half a million tons in 1916 and the possibility of a drop in 1917 and 1918, when no records were kept, this is the only decrease in world tonnage since 1887 and 1888. On the other hand, however, the tonnage is still some 15 million tons above the level of 1914, in spite of the great decrease in trade which has taken place.

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* Canadian and American lake vessels are *not* included.

Certain of the individual figures are worthy of comment. It will be observed, for instance, that the tonnage owned in Great Britain has remained practically stationary throughout the period under review, which, in view of the trading difficulties mentioned above, is an effective tribute to the soundness of her shipping policy. The slight but steady increase in Dominion tonnage is an index of an equally sound policy of gradual development. The huge ship-building effort of America during and after the war is shown by her increases of over 10 million tons between 1914 and 1921, and the effect of the Versailles Treaty caused the drop in Germany's tonnage from 5 million tons in 1914 to just over half a million in 1921. The increase of over a million tons in France, Holland, and Italy is also to be noted, as is the increase of 2 millions in Japan.

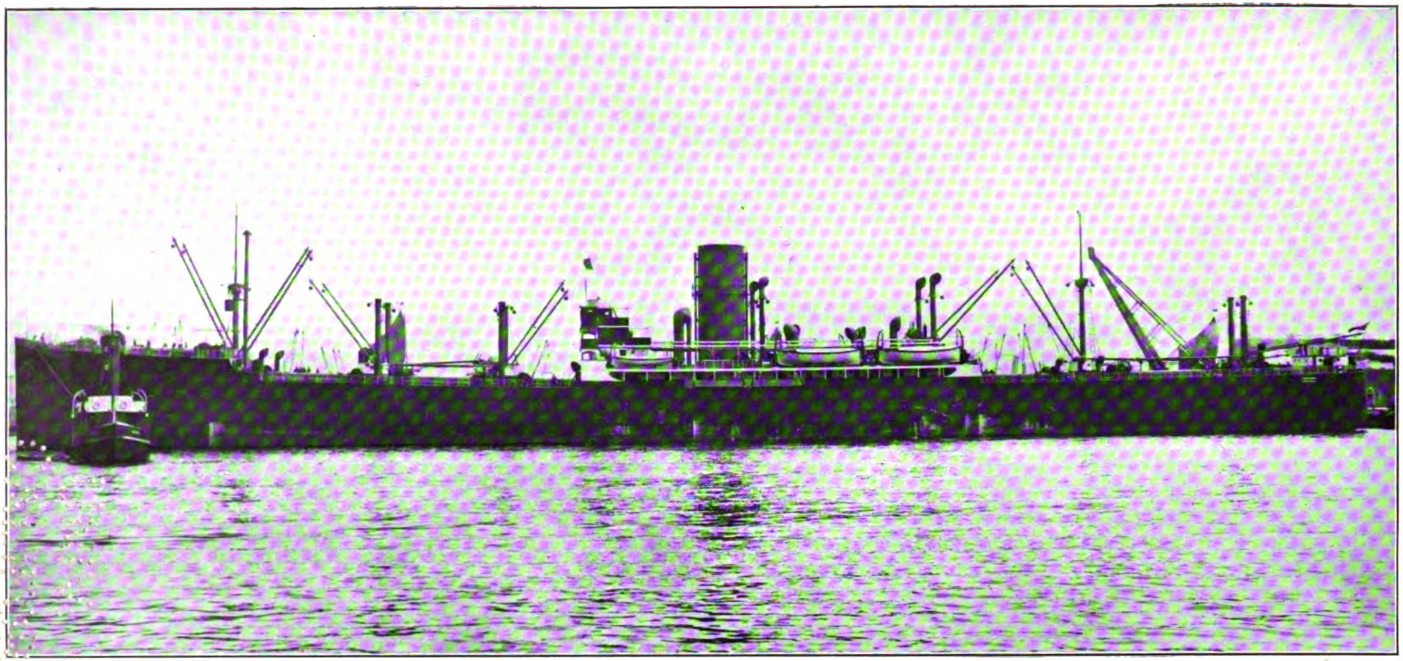
### INCREASED FOREIGN TONNAGE.

These, and the other changes which have taken place, are perhaps more clearly shown in Table III., which gives the differences between the amounts of steam and motor tonnage owned in various years. It will be seen that practically the whole of the increase which has taken place, has been due to tonnage increases abroad, America being responsible for 10 out of the total of 15 million tons. The decrease

TABLE III.—DIFFERENCES IN SEAGOING STEEL AND IRON STEAM AND MOTOR TONNAGE OWNED BY THE PRINCIPAL MARITIME COUNTRIES IN VARIOUS YEARS.
(Thousands of gross tons, *i.e.* 000's omitted.)

| Country. | Differences.* June, 1914, and June, 1921. | June, 1914, and June, 1923. | June, 1914, and June, 1924. | June, 1921, and June, 1922 | June, 1922, and June, 1923 | June, 1923, and June, 1924. |
|---|---|---|---|---|---|---|
| United Kingdom . . | 411 | 200 | 40 | −235 | 24 | −160 |
| British Dominions . . | 543 | 812 | 807 | 251 | 18 | −5 |
| British Empire . . . | 954 | 1,012 | 847 | 16 | 42 | −165 |
| America (United States) | 10,477 | 10,630 | 9,986 | 192 | −39 | −644 |
| Denmark . . . . | 98 | 152 | 206 | 78 | −24 | 54 |
| France . . . . . | 1,128 | 1,347 | 1,275 | 257 | −38 | −72 |
| Germany . . . . | −4,444 | −2,602 | −2,242 | 1,129 | 713 | 360 |
| Greece . . . . . | −244 | −77 | −69 | 77 | 90 | 8 |
| Holland . . . . . | 736 | 1,135 | 1,061 | 406 | −7 | −73 |
| Italy . . . . . . | 950 | 1,360 | 1,248 | 222 | 188 | −112 |
| Japan . . . . | 1,421 | 1,760 | 2,013 | 262 | 77 | 253 |
| Norway . . . . . | 362 | 376 | 403 | 52 | −38 | 27 |
| Spain . . . . . | 211 | 286 | 280 | 93 | −18 | −6 |
| Sweden . . . . . | 45 | 100 | 154 | −41 | 96 | 54 |
| Other Countries . . | 1,061 | 998 | 905 | −158 | 95 | −93 |
| Total Abroad . . | 10,749 | 14,413 | 14,169 | 2,569 | 1,095 | −244 |
| World's Total . . | 11,703 | 15,425 | 15,016 | 2,585 | 1,137 | −409 |

* The figures given represent increases except where preceded by a minus sign.



(*Photo: Sport and General.*)

T.S S. FORDSDALE FOR AUSTRALIAN COMMONWEALTH LINE OF STEAMERS.

(*Constructed at the Commonwealth Dockyard, Cockatoo Island, Sydney, N.S.W.*)

over the past year of 644,000 tons in the United States, however, is significant, while the gains of 360,000 and 253,000 tons in Germany and Japan, respectively, also deserve attention. The warning is necessary, however, that some of the more spectacular changes are artificial in character, and are not justified by the economic position of the countries concerned.

The point which still remains to be discussed is the proportion which is owned in the various countries; in this connection, Table IV., which gives the percentage of tonnage owned by the various countries, will be of interest. It will be seen that the British contribution to the world fleet has remained constant over the past year; the decrease of 11 per cent. from the pre-war figure for the British Empire is due, as we have seen, to the increase in foreign-owned tonnage, and not to a decrease in British tonnage figures.

TABLE IV.—PERCENTAGE OF THE WORLD'S TOTAL STEEL AND IRON SEAGOING STEAM AND MOTOR TONNAGE OWNED BY THE PRINCIPAL MARITIME COUNTRIES.

| Country. | As at Juue, 1914. | As at June, 1921. | As at June, 1922 | As at June, 1923. | As at June, 1924. |
|---|---|---|---|---|---|
| United Kingdom . . | 44·4 | 35·6 | 33·5 | 32·9 | 32·9 |
| British Dominions | 3·3 | 3·6 | 3·9 | 3·8 | 3·8 |
| British Empire . | 47·7 | 39·2 | 37·4 | 36·7 | 36·7 |
| United States . . | 4·3 | 22·7 | 22·0 | 21·5 | 20·5 |
| Austria-Hungary . | 2·5 | Nil. | Nil. | Nil. | Nil. |
| Denmark . . . | 1·8 | 1·7 | 1·7 | 1·6 | 1·7 |
| France . . . . . | 4·5 | 5·6 | 5·8 | 5·6 | 5·6 |
| Germany . . . | 12·0 | 1·2 | 3·1 | 4·3 | 5·0 |
| Greece . . . . . | 1·9 | 1·1 | 1·2 | 1·3 | 1·3 |
| Holland . . . | 3·5 | 4·1 | 4·6 | 4·5 | 4·4 |
| Italy . . . . . | 3·4 | 4·4 | 4·6 | 4·8 | 4·7 |
| Japan . . . . . | 3·9 | 5·6 | 5·9 | 5·9 | 6·4 |
| Norway . . . . | 4·5 | 4·2 | 4·1 | 4·0 | 4·0 |
| Spain . . . . . | 2·1 | 2·0 | 2·1 | 2·0 | 2·0 |
| Sweden . . . . | 2·3 | 1·9 | 1·7 | 1·9 | 2·0 |
| Other Countries . | 5·6 | 6·3 | 5·8 | 5·9 | 5·7 |
| Total Abroad . | 55·6 | 64·4 | 66·5 | 67·1 | 67·1 |
|  | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 |

Germany is rapidly recovering, both in actual tonnage and in her proportion of the world's merchant fleet, while Japan shows a steady increase. On the other hand, the United States is finding it impossible to maintain the abnormal increase due to her war programme.

## THE SIZE OF SHIP UNITS.

In a previous contribution* reference was made to the consolidation of tramp services into cargo-liner routes, and the consequent increase in the average size of ship units. In that contribution, the steam and

* "Brassey's Naval and Shipping Annual," 1921–2, pp. 209, 210.

motor tonnage in existence was divided into three main divisions—a dividing line at 1,500 gross tons roughly separated coasting vessels from those engaged in foreign trade; another division at 5,000 tons gross represented the approximate upper limit in size of the tramp steamer in pre-war days; while a third division at 10,000 tons gross separated cargo liners and the intermediate type of passenger vessel from the big passenger liners. Table V. extends the information given in the previous contribution to show the position as at June, 1924, and gives the percentage of the total seagoing steam and motor tonnage owned in the British Empire, the United States, Japan, and other countries, which falls into these groups.

TABLE V.—THE SIZE OF SHIP UNITS.

The approximate percentages, by certain tonnage divisions, of the total seagoing steam and motor tonnage owned in the countries shown.

| Country. | Divisions of Gross Tonnage. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Under 1,500. | | | 1,500 and under 5,000. | | | 5,000 and under 10,000. | | | 10,000 and above. | | |
| | 1914. | 1921. | 1924. | 1914. | 1921. | 1924. | 1914. | 1921. | 1924. | 1914. | 1921. | 1924. |
| British Empire . . | 8·3 | 10·6 | 11·9 | 56·0 | 36·1 | 34·9 | 26·0 | 40·8 | 39·7 | 9·7 | 12·5 | 13·5 |
| United States . | 15·3 | 1·6 | 3·8 | 50·2 | 35·4 | 41·1 | 27·5 | 55·6 | 49·7 | 7·0 | 7·4 | 5·4 |
| Japan . . | 10·4 | 20·2 | 15·5 | 61·0 | 37·9 | 45·5 | 23·6 | 38·9 | 35·4 | 5·0 | 3·0 | 3·6 |
| Other Countries | 27·5 | 28·8 | 26·8 | 47·0 | 41·4 | 40·8 | 19·9 | 25·9 | 27·7 | 5·6 | 3·9 | 4·7 |
| World Total | 17·6 | 15·4 | 16·2 | 51·7 | 37·9 | 39·2 | 23·1 | 38·9 | 36·8 | 7·6 | 7·8 | 7·8 |

It will be seen that a considerable change has taken place in the size of ships since pre-war days, the cargo-liner group being now roughly of equal importance to the tramp group. Both in the British Empire and the United States, however, the cargo-liner group has become of more importance, and it is not perhaps wrong to attribute this to the war-time shipbuilding programmes of the two countries, and to regard it as being somewhat artificial.

A point which is of particular interest is the persistent increase in the large tonnage group, in the case of the British Empire. The group which comprises the big passenger liners and large bulk carriers, that of 10,000 gross tons and above, has increased from 9·7 per cent. in 1914 to no less than 13·5 per cent. in 1924—an actual increase of approximately a million gross tons of such vessels. This is not surprising, in view of the large share taken by this country in the North Atlantic services. Great Britain to-day owns nearly 60 per cent. of the tonnage employed in regular services between the United Kingdom and Continent on the one hand, and the United States on the other, and in 1923 one British company alone transported over 68,000 passengers from Southampton, Liverpool, and London to the United States.

## THE AGE OF MERCHANT SHIPS.

Before the war very little information was collected in regard to the age of the world's fleets of merchant ships, and in fact the only reliable figures were those having reference to the United Kingdom. The average age of the British merchant fleet on December 31, 1913, was approximately 10·5 years, while nearly 68 per cent. was under thirteen years old. In 1922, however, Lloyd's Register of Shipping published the first tables of size and age covering the world's fleet, and it is now possible to compare the composition of the fleets of the various maritime countries, from the age point of view and from year to year. Table VI. shows the percentage of the fleet of each of the principal maritime countries which fell into various age groups at June, 1922, and June, 1924 :—

TABLE VI.—PERCENTAGE OF THE TOTAL SEAGOING STEAM AND MOTOR TONNAGE OWNED IN THE PRINCIPAL MARITIME COUNTRIES, BY CERTAIN AGE GROUPS.

| Country. | Divisions of Age. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Under 5 years. | | 5 years and under 15. | | 15 years and under 25. | | 25 years and over. | |
| | 1922. | 1924. | 1922. | 1924. | 1922. | 1924. | 1922. | 1924. |
| United Kingdom . | 31·5 | 26·1 | 34·5 | 42·6 | 26·0 | 22·8 | 8·0 | 8·5 |
| Dominions . . | 27·4 | 22·9 | 27·8 | 30·7 | 25·8 | 26·1 | 19·0 | 20·3 |
| United States * . | 73·6 | 30·4 | 13·7 | 56·8 | 8·4 | 8·1 | 4·3 | 4·7 |
| Denmark . . | 31·7 | 33·6 | 26·6 | 29·5 | 26·6 | 22·2 | 15·1 | 14·7 |
| France . . . . | 28·7 | 32·3 | 27·4 | 35·8 | 21·2 | 20·6 | 12·7 | 11·3 |
| Germany . . | 43·7 | 52·0 | 17·2 | 12·9 | 25·5 | 19·9 | 13·6 | 15·2 |
| Holland . . . | 38·5 | 36·8 | 40·5 | 41·0 | 17·8 | 18·8 | 3·2 | 3·4 |
| Italy . . . . | 34·2 | 27·0 | 21·3 | 27·8 | 26·9 | 26·6 | 17·6 | 18·6 |
| Japan . . . . | 46·2 | 21·8 | 22·3 | 41·9 | 13·3 | 17·7 | 18·2 | 18·6 |
| Norway . . . | 36·7 | 30·2 | 31·9 | 38·0 | 20·7 | 20·2 | 10·7 | 11·6 |
| Spain . . . . | 31·3 | 22·3 | 13·8 | 20·9 | 13·6 | 13·5 | 41·3 | 43·3 |
| Sweden . . . . | 30·4 | 22·4 | 23·7 | 26·5 | 19·4 | 21·2 | 26·5 | 29·9 |
| Total World Fleet* | 42·2 | 27·7 | 25·9 | 40·1 | 20·3 | 19·6 | 11·6 | 12·6 |

While it is to be regretted that it is not at present possible to make a comparison with the pre-war position, this table shows with remarkable clearness the effect of the war shipbuilding programmes of the various countries, and the fact that it was artificial and therefore short-lived. Germany shows an extensive increase in the percentage under five years of age, and Denmark and France show slight increases; all the remaining countries show decreases, the United States in particular falling from the huge figure of 73·6 per cent. in 1922 to just over 30 per cent. in 1924. Great Britain, the United States, and Holland are remarkable for the small percentages of their fleets which are over twenty-five years of age, while Spain has a consistently large proportion of old tonnage. As much as 12·6 per cent. of the world's tonnage, or about 7½ million tons, is over twenty-five years of age.

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* Excluding American lake vessels.

## THE EMPLOYMENT OF TONNAGE.

In view of the huge war-time shipbuilding programme, and the presence of such a large proportion of old vessels in the world's fleet. it is of interest to refer once again to the question of the employment of the tonnage which is in existence. The world has been passing through a period of extreme trade depression, and so much tonnage has in consequence been laid up, either temporarily or permanently. that the tonnage owned by a particular country is no longer any real index of her participation in world trade. Fortunately, account may be taken of this factor of the situation, as for the past two years information has been collected as to the amount of tonnage laid up in the various countries. Broadly speaking, this may be taken to represent the amount of tonnage of each particular country which is laid up, for it is not usual for a vessel owned in one country to be laid up in another. Table VII. shows the position at the various periods when figures have been collected :—

TABLE VII.—TONNAGE LAID UP IN THE PRINCIPAL MARITIME COUNTRIES OF THE WORLD.

(Millions of gross tons.)

| Country. | Jan. 1922. | July, 1922. | Jan., 1923 | July, 1923. | Jan., 1924. | July, 1924. |
|---|---|---|---|---|---|---|
| United Kingdom . . | 1·769 | 1·667 | 1·010 | 1·064 | 0·909 | 0·700 |
| Australia . . . . | 0·050 | 0·100 | 0·107 | 0·216 | 0·085 | 0·087 |
| United States . . . | 5·309 | 4·715 | 5·328 | 4·575 | 4·271 | 4·265 |
| France . . . . . | 1·085 | 1·200 | 0·730 | 0·725 | 0·450 | 0·317 |
| Holland . . . . | 0·327 | 0·330 | 0·330 | 0·250 | 0·235 | 0·129 |
| Japan . . . . . | 0·120 | 0·079 | 0·099 | 0·036 | 0·029 | 0·029 |
| Italy . . . . . | 0·585 | 0·585 | 0·472 | 0·559 | 0·427 | 0·252 |
| Scandinavia . . . | 0·572 | 0·259 | 0·092 | 0·085 | 0·063 | 0·023 |
| Greece . . . . . | 0·170 | 0·048 | 0·076 | 0·094 | 0·122 | 0·091 |
| Belgium . . . . | 0·275 | 0·275 | 0·170 | 0·161 | 0·086 | 0·035 |
| Spain . . . . . | 0·530 | 0·530 | 0·520 | 0·241 | 0·123 | 0·098 |
| Idle in other Countries† | 0·192 | * | 0·195 | 0·039 | 0·088 | 0·099 |
| Total . . . | 10·984 | 9·788 | 9·129 | 8·045 | 6·888 | 6·125 |

The outstanding feature of the table is, of course, the large amount of tonnage laid up in the United States—a very evident proof that her gigantic shipbuilding effort just after the war was not economically justified. Indeed, the tonnage laid up in that country practically all consists of Government-owned ships, the actual amounts of Government-owned laid-up tonnage included in the United States figures being :—

| | Millions of gross tons. |
|---|---|
| January, 1922 . . . . . . . . . . . | 4·528 |
| July, 1922 . . . . . . . . . . . . | 4·192 |
| January, 1923 . . . . . . . . . . . | 4·625 |
| July, 1923 . . . . . . . . . . . . | 4·107 |
| January, 1924 . . . . . . . . . . . | 3·730 |
| July, 1924 . . . . . . . . . . . . | 3·953 |

* No information.  † Belonging to the countries given in the Table.

Since Table VII. does not include all the countries of the world, it is probable that a total of something like 7 million tons was laid up at the beginning of this year, and possibly 6½ millions in July, 1924. If the figures given in the table are deducted from the tonnage owned by the several countries, the result will be a generous estimate of the amount of tonnage actually in employment—quite apart from the fact that in the depressed conditions which obtain to-day, vessels are frequently run with very light cargoes, and so may be regarded as not fully employed. Table VIII. shows the effect of such a method of estimation, and it is thought that the result is a far better picture of the shipping position of the various countries than the uncorrected tonnage figures. For purposes of comparison, the percentages of the estimated fleet in employment owned by the various countries are given. It should be borne in mind that the figures of tonnage owned in the various countries do not compare with those given in Table IV., which are for *steel and iron* steam and motor tonnage only; the figures given in Table VIII. are for all classes of steam and motor tonnage.

TABLE VIII.—ESTIMATED APPROXIMATE AMOUNT OF SEAGOING STEAM AND MOTOR TONNAGE ACTUALLY EMPLOYED BY THE VARIOUS MARITIME COUNTRIES IN 1924.

(Millions of Gross Tons.)

(NOTE.—The estimate is obtained by deducting *all* tonnage recorded as laid up in the various countries, from the figures of *steam and motor* tonnage owned in the various countries. The figures for tonnage laid up are as at July, 1924, and those of tonnage owned as at June, 1924.)

| Country. | Gross tonnage owned. | Percentage of world total. | Tonnage laid up. | Percentage of world total.* | Estimated tonnage actually employed. | Percentage of world total. |
|---|---|---|---|---|---|---|
| United Kingdom . | 18·954 | 32·0 | 0·700 | 11·4 | 18·254 | 34·4 |
| United States * . . | 12·431 | 21·0 | 4·265 | 69·6 | 8·166 | 15·4 |
| France . . . . . | 3·290 | 5·6 | 0·317 | 5·2 | 2·973 | 5·6 |
| Holland . . . . | 2·542 | 4·3 | 0·129 | 2·1 | 2·413 | 4·5 |
| Japan . . . . . | 3·843 | 6·5 | 0·029 | 0·5 | 3·814 | 7·2 |
| Italy . . . . . | 2·719 | 4·6 | 0·252 | 4·1 | 2·467 | 4·6 |
| Scandinavia . . . | 4·573 | 7·7 | 0·023 | 0·4 | 4·550 | 8·6 |
| Greece . . . . | 0·757 | 1·3 | 0·091 | 1·5 | 0·666 | 1·3 |
| Belgium . . . . | 0·556 | 0·9 | 0·035 | 0·6 | 0·521 | 1·0 |
| Spain . . . . . | 1·188 | 2·0 | 0·098 | 1·6 | 1·090 | 2·1 |
| World Total . . | 59·238 | | 6·125† | | 53·113 | |

The corrected total of world steam and motor tonnage, 53,113,000 gross tons, is still about ten million tons more than the total amount of seagoing steam and motor tonnage owned in the world in 1914—43,143,000 gross tons. At the most only some 4 millions of this increase is due to the increase in tanker tonnage which has taken place as the natural result of the increased demand for oil.

The examination of this and the other figures which have been given leads inevitably to the conviction that there is little or no prospect of any great increase in shipbuilding for some time to come.

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* Excluding lake vessels.

† See remarks regarding Table VII.

But before passing to a survey of the actual figures of ship production, it will be well to examine briefly two factors which may tend to modify that statement. A revolution in the means of ship propulsion, such as that which took place when the steam engine was introduced, would shorten the economic life of the existing ship units, and at the same time tend to produce increased activity in the shipyards. It will be of interest, therefore, to examine the progress of the motor vessel, and see how far that is likely to affect the shipbuilding position. The other factor is that with 7½ million tons of shipping in the world over twenty-five years of age, and, in addition, a large amount of war-built shipping of inferior workmanship, which is consequently uneconomical in operation, a great increase in shipbreaking will be necessary before shipbuilding can proceed at a normal rate.

## METHODS OF PROPULSION.

Table IX. shows the proportion of the world's fleet of merchant vessels dependent on the various means of propulsion, in 1914 and in 1922, 1923, and 1924 :—

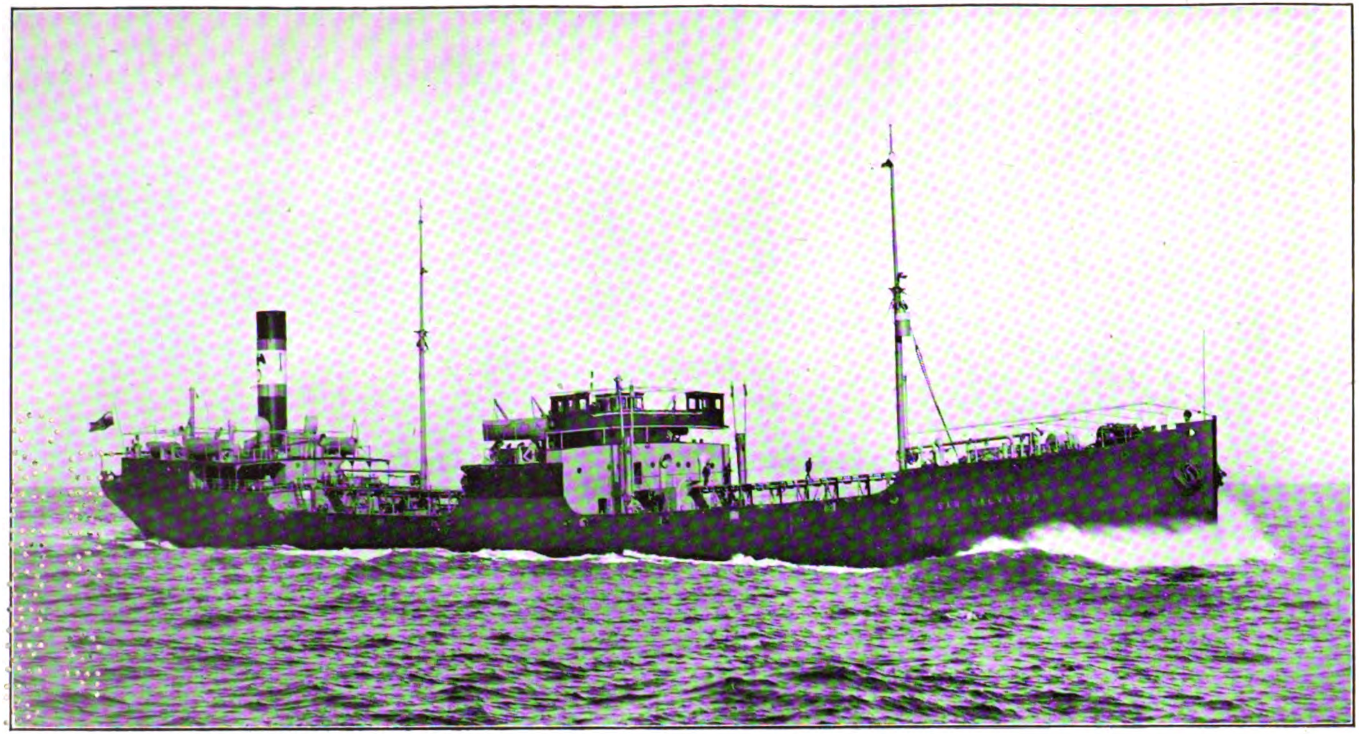
TABLE IX.—PERCENTAGE OF THE WORLD'S TOTAL FLEET OF MERCHANT VESSELS USING THE SPECIFIED FORMS OF MOTIVE POWER.

(The percentages given are of the total gross tonnage owned in the world.)

| Motive power. | 1914. | 1922. | 1923. | 1924. |
|---|---|---|---|---|
| Sail power only . . . . . . | 7·95 | 4·70 | 4·34 | 3·92 |
| Internal-combustion engines . | 0·47 | 2·35 | 2·56 | 3·09 |
| Oil fuel under boilers. . . . | 2·62 | 22·34 | 24·23 | 26·79 |
| Coal. . . . . . . . . . | 88·96 | 70·61 | 68·87 | 66·20 |
|  | 100·00 | 100·00 | 100·00 | 100·00 |

It will be seen that there has been a rapid increase in the proportion of vessels propelled by internal-combustion engines, and a startling rise in the percentage of vessels using oil fuel under boilers, over a quarter of the world's tonnage now being fitted in this way. No more striking evidence of the economies possible by the use of oil fuel could be possible than this most significant increase, for it is obvious that there must be large losses from the thermal efficiency point of view in such a method of employing oil as fuel. It will be of interest also to see what countries in particular have participated in these movements, seeing that to-day roughly a third of the world's tonnage uses oil as fuel for propulsion; this is shown in Table X. on the opposite page.

It is to be observed that, as a result of her war-time shipbuilding programme, the United States owned roughly a half of the tonnage fitted for burning oil fuel under boilers. As has been seen, however, this tonnage includes a large proportion which is either permanently or temporarily laid up. In spite of Great Britain's importance as a coal producing country, it will be noticed that nearly a quarter of her tonnage is fitted to burn oil fuel. It is also to be noticed that



OIL-TANK STEAMER SAN SALVADOR FOR THE EAGLE OIL TRANSPORT CO., LTD.

*(Constructed by Messrs. Sir W. G. Armstrong, Whitworth & Co., Ltd.)*

Great Britain, and the Scandinavian countries collectively, both own approximately a third of the world's motor tonnage. The percentage of motor tonnage owned in Denmark is remarkably high.

TABLE X.—GROSS TONNAGE OF STEAMERS FITTED FOR BURNING OIL FUEL, AND MOTOR VESSELS, OWNED IN THE PRINCIPAL MARITIME COUNTRIES.*

(Millions of gross tons.)

| Country. | Steamers fitted for burning oil fuel. | | Motor vessels.‡ | |
|---|---|---|---|---|
| | Tonnage. | Percentage of total steam and motor tonnage owned. | Tonnage. | Percentage of total steam and motor tonnage owned. |
| United Kingdom . . | 4·342 | 22·9 | ·507 | 2·7 |
| Dominions . . . | 0·445 | 17·6 | ·018 | 0·7 |
| United States (Sea) . | 9·091 | 73·2 | ·191 | 1·5 |
| Belgium . . . . | 0·046 | 8·3 | ·008 | 1·4 |
| Denmark . . . . | 0·061 | 6·2 | ·168 | 17·0 |
| France . . . . . | 0·356 | 11·1 | ·026 | 0·8 |
| Germany . . . . | 0·252 | 8·8 | ·114 | 4·0 |
| Holland . . . . | 0·749 | 29·5 | ·069 | 2·7 |
| Italy . . . . . | 0·342 | 12·6 | ·073 | 2·7 |
| Japan . . . . . | 0·483 | 12·7 | ·007 | 0·2 |
| Norway . . . | 0·503 | 21·0 | ·192 | 8·0 |
| Spain . . . . . | 0·086 | 7·2 | ·017 | 1·4 |
| Sweden . . . . | 0·069 | 5·8 | ·196 | 16·5 |
| Other Countries . . | 0·303 | 7·3 | ·052 | 1·2 |
| World . . . | 17·153 | 29·0 | 1·638 | 2·8 |

## OBSOLETE TONNAGE.

The increase of motor tonnage in the last ten years from ½ to 3 per cent. of the total tonnage in existence is significant, and it is probable that once shipowners as a body are convinced that the motor vessel is as reliable in service as her sister fitted for steam propulsion, shipyards may expect to have a large number of orders for this type of ship. It is not to be expected, however, that the internal-combustion engine will be taken up with any great rapidity, especially in view of the present depressed state of the shipping industry. It is in the replacement of obsolete tonnage that the real hope of the shipyards may be said to lie.

Before the war, about 1¼ per cent. of the world's steam and motor tonnage was lost annually by sea risks, and this percentage has fallen slightly since the war, in spite of the increased risks due to drifting mines and so forth, owing to the smaller amount of tonnage actually employed as compared with the total in existence. The figure is remarkably constant, and consequently the shipbuilding requirement on this account is also approximately constant. On the other hand, before the war an average of 0·45 per cent. of the world's fleet of merchant vessels was broken up each year, and this percentage dropped to only 0·06 for the eight years 1914 to 1921 inclusive. It follows that a large percentage of old vessels was retained in service, since we have seen that the tonnage destroyed by the German submarine campaign was more than replaced by the Allied shipbuilding efforts. It has also been pointed out that 7½ million tons of the world's present fleet of steam and motor vessels is over twenty-five years old. It will therefore be of interest to see what efforts are being made to deal with this question, which so seriously affects the efficiency of the world's merchant fleet. The amount of tonnage broken up by reason of old age and obsolescence in various years is given below :—

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* As at June, 1924.

† Excluding lake vessels.

‡ Excluding vessels fitted with auxiliary motors only.

| | Gross tons. |
|---|---|
| 1901 | 109,977 |
| 1906 | 200,292 |
| 1911 | 255,517 |
| 1914 | 128,978 |
| 1915 | 48,773 |
| 1916 | 11,114 |
| 1917 | 10,040 |
| 1918 | 3,028 |
| 1919 | 12,351 |
| 1920 | 11,951 |
| 1921 | 93,431 |
| 1922 | 371,101 |
| 1923 | 1,140,207 |

The rise from 1901 to 1911 is commensurate with the increase which took place in the size of the fleet ; but it is quite evident that the decrease which took place from 1914 to 1921 would have been sufficient in itself to unsettle the balance of the shipping and shipbuilding industries, even without the disturbances in world conditions of which it was a concomitant part.

The huge total for 1923 is a definite sign that the seriousness of the position is recognized, although it must be pointed out that by no means all of that total consists of normally obsolete shipping. Of the 1,140,207 tons, a total of 201,311—practically all steam vessels—belonged to Great Britain, and may be regarded as old ships due for breaking up in the regular course. But of the remainder, the United States is responsible for no less than 350,477 tons, practically the whole of which consists of hurriedly-built war-time wooden steamers which have been proved useless for ordinary peace-time trading. It cannot be said that the rate at which shipbreaking is proceeding is yet adequate to deal with the great accumulation of old ships which has taken place. The total of over a million tons for 1923 is a healthy sign, but this could be doubled during 1924 with advantage both to the shipping and shipbuilding industries, and a programme of 2 million tons per annum for four years would barely suffice to restore the pre-war efficiency of the world's fleet.

In this connection it is of interest to record the recent statement that an American salvage concern has acquired 218 war-built wood ships, at a cost of £52,400, which are to be burnt to recover their metal content. It is significant that these vessels are said to have been built by direction of the American Government, at a total cost of roughly £47,000,000.

### THE WORLD'S SHIPBUILDING.

Turning now to the position of the world's shipbuilding industry, Table XI. shows the total amount of gross tonnage of vessels of 100 tons and upwards launched in the various countries in 1913 and during the last five years.

It will be seen that there has been a further large drop in 1923, the output for that year being only one-half of the 1913 figure. The decline is fairly general, but the United States shows a heavy decrease, even as compared with the 1913 figures; when the vast expansion in shipyard capacity is taken into account, the decrease is extraordinary. It should also be noted that in Germany the decline has not been nearly so serious, and that Japan, Italy, and the Scandinavian countries actually launched more merchant tonnage last year than in the pre-war "peak" year, 1913. The drop in output in the United Kingdom is most serious, being only a third of the 1913 figure.

TABLE XI.—THE WORLD'S SHIPBUILDING, IN MILLIONS OF GROSS TONS.

| Country. | 1913. | 1919. | 1920. | 1921. | 1922. | 1923. |
|---|---|---|---|---|---|---|
| United Kingdom | 1·932 | 1·620 | 2·056 | 1·538 | 1·031 | 0·646 |
| British Dominions * | 0·027 | 0·298 | 0·174 | 0·118 | 0·053 | 0·037 |
| British Empire | 1·959 | 1·918 | 2·230 | 1·656 | 1·084 | 0·683 |
| Germany | 0·465 | ? | ? | 0·509 | 0·575 | 0·358 |
| United States † | 0·228 | 3·040 | 2·319 | 0·995 | 0·097 | 0·096 |
| France | 0·176 | 0·033 | 0·093 | 0·211 | 0·185 | 0·097 |
| Holland | 0·104 | 0·137 | 0·183 | 0·232 | 0·163 | 0·066 |
| Japan | 0·064 | 0·612 | 0·457 | 0·227 | 0·083 | 0·072 |
| Austria-Hungary | 0·062 | Nil. | Nil. | Nil. | Nil. | Nil. |
| Italy ‡ | 0·050 | 0·083 | 0·133 | 0·165 | 0·101 | 0·067 |
| Scandinavia | 0·110 | 0·147 | 0·164 | 0·195 | 0·103 | 0·112 |
| Other Countries | 0·043 | 0·079 | 0·096 | 0·129 | 0·043 | 0·012 |
| **World's Total * †** | 3·261 | 6·049 § | 5·705 § | 4·319 | 2·434 | 1·563 |

It will be observed from Table XII., page 178, that the proportion of tonnage built in this country has decreased from 59·2 per cent. to 41·4, Japan, Germany, and the Scandinavian countries increasing proportionately. As was remarked in last year's "Annual," there appears to be a decided tendency on the part of other countries to return to their pre-war share in world shipbuilding.

It is not sufficient, however, to examine the figures of output alone, for any improvement in the position will at first manifest itself, not in the figures of tonnage launched, but in the statistics of tonnage commenced and on the stocks. The Quarterly Shipbuilding Returns issued by Lloyd's Register of Shipping show that whereas the annual output is at a very low ebb, some improvement in the position is at last taking place.

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* Excludes Canadian Great Lakes vessels.

† Excludes wooden vessels, and American Great Lakes tonnage.

‡ Italy now includes Trieste.

§ Excludes Germany.

TABLE XII.—THE PERCENTAGE OF THE WORLD'S TOTAL AMOUNT OF TONNAGE BUILT IN THE PRINCIPAL SHIPBUILDING COUNTRIES.

(See footnotes to Table XI. on p. 177.)

| Country. | 1913. | 1919. | 1920. | 1921. | 1922. | 1923. |
|---|---|---|---|---|---|---|
| United Kingdom . . . | 59·2 | 26·8 | 36·0 | 35·7 | 42·3 | 41·4 |
| British Dominions . . | 0·8 | 4·9 | 3·1 | 2·7 | 2·2 | 2·3 |
| British Empire . . . | 60·0 | 31·7 | 39·1 | 38·4 | 44·5 | 43·7 |
| Germany . . . . . | 14·3 | ? | ? | 11·8 | 23·6 | 23·0 |
| United States . . . . | 7·0 | 50·3 | 41·2 | 23·0 | 4·0 | 6·2 |
| France . . . . . . | 5·4 | 0·5 | 1·6 | 4·9 | 7·6 | 6·2 |
| Holland . . . . . | 3·2 | 2·3 | 3·2 | 5·4 | 6·7 | 4·2 |
| Japan . . . . . . | 2·0 | 10·1 | 8·0 | 5·2 | 3·4 | 4·6 |
| Austria-Hungary . . . | 1·9 | Nil. | Nil. | Nil. | Nil. | Nil. |
| Italy . . . . . . | 1·5 | 1·4 | 2·3 | 3·8 | 4·2 | 4·2 |
| Scandinavia . . . . | 3·4 | 2·4 | 2·9 | 4·5 | 4·3 | 7·1 |
| Other Countries . . . | 1·3 | 1·3 | 1·7 | 3·0 | 1·7 | 0·8 |
| | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 |

Table XIII. shows that, for the United Kingdom, the tonnage on which construction was commenced during the quarter dropped from 594,000 gross tons for the September quarter, 1920, to under a fifth of that figure by September, 1923, but has risen again to over three-fifths of that figure in the June quarter of 1924. Even more significant is the rise from 66,000 tons launched during the September quarter

TABLE XIII.—SHIPBUILDING, IN MILLIONS OF GROSS TONS.*

(See also Table XIV., page 179, and Table XV., page 180.)

| Quarter ended. | United Kingdom. | | | Other Countries. | | | Total. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Under construction. | Commenced. | Launched. | Under construction. | Commenced. | Launched. | Under construction. | Commenced. | Launched. |
| Sept., 1919 | 2·817 | — | 0·416 | 5·232 | — | 1·371 | 8·049 | — | 1·787 |
| Sept., 1920 | 3·731 | 0·594 | 0·483 | 3·834 | 0·788 | 1·005 | 7·565 | 1·382 | 1·488 |
| Sept., 1921 | 3·283 | 0·051 | 0·308 | 2·260 | 0·265 | 0·539 | 5·543 | 0·316 | 0·847 |
| Sept., 1922 | 1·617 | 0·082 | 0·307 | 1·086 | 0·106 | 0·169 | 2·703 | 0·188 | 0·476 |
| Dec., 1922 | 1·468 | 0·231 | 0·261 | 1·022 | 0·114 | 0·181 | 2·490 | 0·345 | 0·442 |
| Mar., 1923 | 1·492 | 0·335 | 0·228 | 1·025 | 0·176 | 0·145 | 2·517 | 0·531 | 0·373 |
| June, 1923 | 1·338 | 0·241 | 0·239 | 0·854 | 0·073 | 0·171 | 2·192 | 0·314 | 0·410 |
| Sept., 1923 | 1·271 | 0·112 | 0·066 | 0·761 | 0·100 | 0·206 | 2·032 | 0·212 | 0·272 |
| Dec., 1923 | 1·395 | 0·245 | 0·115 | 0·713 | 0·137 | 0·148 | 2·108 | 0·382 | 0·263 |
| Mar., 1924 | 1·474 | 0·228 | 0·362 | 0·744 | 0·170 | 0·163 | 2·218 | 0·398 | 0·525 |
| June, 1924 | 1·517 | 0·375 | 0·365 | 0·759 | 0·189 | 0·137 | 2·276 | 0·564 | 0·502 |

* Excluding tonnage in Danzig and Germany. See Table XIV., page 179.

of 1923 to 365,000 tons launched during the quarter ended June, 1924. On the other hand, there is as yet no sign of any great rise in the other countries of the world, either in tonnage commenced or tonnage launched.

### ACTIVITY IN GERMANY.

The figures do not include Germany and Danzig, the tonnage for which countries is shown in Table XIV. It will be noticed that the shipbuilding at Danzig is now of quite a small order, but that Germany, while not maintaining the large figures of her immediate post-war programme, is nevertheless building a considerable quantity of tonnage. It is to be observed, however, that the proportion of tonnage launched to tonnage under construction is very much lower than the average, indicating that the position in that country is by no means normal.

TABLE XIV.—TONNAGE UNDER CONSTRUCTION, AND LAUNCHED, IN GERMANY AND DANZIG.

| Quarter ended. | Germany. | | Danzig. | |
|---|---|---|---|---|
| | Under construction. | Launched. | Under construction | Launched. |
| June, 1922 * . . . . | 500,000 | 150,000 | 45,000 | ? |
| Sept., 1922 * . . . . | 350,000 | 100,000 † | 40,000 | † |
| Dec., 1922 . . . . | 416,081 | 85,487 | 47,796 | 10,838 |
| Mar., 1923 . . . . | 333,427 | 68,862 | 9,600 | 1,600 |
| June, 1923 . . . . | 301,199 | 118,292 | 51,206 | 41,773 |
| Sept., 1923 . . . | 299,085 | 80,203 | 46,900 | 1,400 |
| Dec., 1923 . . . . | 324,184 | 68,041 | 12,440 | 1,560 |
| Mar., 1924 . . . . | 287,307 | 25,847 | 11,714 | 166 |
| June, 1924 . . . . | 320,254 | 26,348 | 20,495 | — |

The figures of tonnage under construction given in these two tables, unfortunately, do not truly represent actual shipbuilding activity, for one of the worst features of the depression through which the industry has been passing has been the large amount of tonnage on which work has had to be suspended, either through labour disputes, financial difficulties, or other causes. On reference to Table XV., the extent of this factor will at once be recognized, and it will be seen that while in this country there has been a gradual but steady decline in the amount suspended (only arrested during the September quarter, 1923, owing to the boilermakers' dispute), yet in the remaining countries of the world the amount suspended has actually increased from quarter to quarter over the past year, and shows no sign of improvement.

With the gradual revival of trade which has taken place during the last few months, the decrease in laid-up tonnage and suspended

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* Estimated only. † Includes Danzig.

construction, and the increase in shipbreaking, it would appear that there are reasonable grounds for supposing that if only the outstanding difficulties in the labour position can be surmounted, a return to more normal conditions in shipbuilding is in sight.

TABLE XV.—SUSPENDED CONSTRUCTION.

(Millions of Gross Tons.)

| Quarter ended. | United Kingdom. | | | Other Countries. | | | Total. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Under construction. | Suspended. | Actually under construction. | Under construction. | Suspended. | Actually under construction. | Under construction. | Suspended. | Actually under construction. |
| Sept., 1921 . | 3·283 | 0·731 | 2·552 | 2·260 | 0·375 | 1·885 | 5·543 | 1·106 | 4·437 |
| Sept., 1922 . | 1·617 | 0·419 | 1·198 | 1·086 | 0·256 | 0·830 | 2·703 | 0·675 | 2·028 |
| Dec., 1922 . | 1·468 | 0·348 | 1·120 | 1·022 | 0·216 | 0·806 | 2·490 | 0·564 | 1·926 |
| Mar., 1923 . | 1·492 | 0·181 | 1·311 | 1·025 | 0·148 | 0·877 | 2·517 | 0·329 | 2·188 |
| June, 1923 . | 1·338 | 0·130 | 1·208 | 0·854 | 0·132 | 0·722 | 2·192 | 0·262 | 1·930 |
| Sept., 1923 . | 1·271 | 0·244 | 1·027 | 0·761 | 0·083 | 0·678 | 2·032 | 0·327 | 1·705 |
| Dec., 1923 . | 1·395 | 0·164 | 1·231 | 0·713 | 0·067 | 0·646 | 2·108 | 0·231 | 1·877 |
| Mar., 1924 . | 1·474 | 0·101 | 1·373 | 0·744 | 0·118 | 0·626 | 2·218 | 0·219 | 1·999 |
| June, 1924 . | 1·517 | 0·052 | 1·465 | 0·759 | 0·140 | 0·619 | 2·276 | 0·192 | 2·084 |

## SHIPYARD ECONOMICS.

The labour and financial difficulties with which the industry is faced are, however, by no means slight, and it is only by energetic co-operation that any real solution of the problems can be achieved. With a large pool of laid-up tonnage in existence, the demand for new construction is small, and inevitably therefore competition is keen and selling prices low. In point of fact, the average rise in the cost of new shipping is to-day only about 30 per cent. above the pre-war figure, while in this country the figures given by *Fairplay* of the cost of a new, ready, 7,500 ton d.w. cargo steamer show a rise of only 11 per cent. above the 1913 figure. It is to be admitted, of course, that the activity prevailing in the shipyards in 1913 and the early part of 1914 was above the average; in fact, in the crisis of 1908 the price of such a vessel fell as low as £36,000, as compared with £54,000 in 1913. But when it is realized that wages, material, and other costs are well over 50 per cent. above the pre-war level, it will be seen that the situation would be extremely difficult, even if a moderate supply of orders were coming forward. It is obvious that with orders confined to absolutely necessary or special types of vessel, the difficulties are acute, and they are augmented by the inequality of wage adjustment which has taken place following the war-time disturbance of conditions. An industry which has to face international competition must base the price of its product on international demand, and to do this successfully must arrange its costs accordingly. When the selling price in the international market is low, orders can only be competed for if the wage bill is also low, and unless the wage bill is low, the industry, as far as that particular country is concerned, will die. But unfortunately there exist side by side with the producing industries subject to international competition a number of services which are national and non-competitive internationally, but which are still essential to the smooth working of our community life. It is unfortunately true that in such non-competitive, largely non-producing, services there is not the incentive to due and proper wage adjustment that there is in the producing, competitive industries, and a great discrepancy exists to-day between wages in the two classes of service. A large amount of the friction which has occurred in the shipyards as a result of wage reductions has been due to the fact that high wages are still being paid by municipal and other local authorities for unskilled work. This keeps the cost of living at a high level, and so diminishes the purchasing power of the reduced wages which, in view of foreign competition, have perforce to be paid in the shipyards. Ultimately, proportionality in wage adjustments as between industry and industry is essential, for it is obvious that there is a limit beyond which it is impossible to reduce wages below the cost of living level.

TABLE XVI.—THE PERCENTAGE INCREASE IN VARIOUS ITEMS OF SHIPYARD COSTS IN VARIOUS COUNTRIES SINCE 1913.

[NOTE.—The figures given are as compared with 100 in 1913: in some cases, where representative figures for 1913 are not available, the figures for the commencement of 1914 have been used. In all possible cases the 1924 figures have been taken as at July 1st. Prices have, in all cases, been reduced to sterling before the percentage increase was calculated.]

| Item. | Great Britain. | United States. | Germany. | Holland. | Norway. | Sweden. |
|---|---|---|---|---|---|---|
| Selling price of cargo tonnage . . . . . | 111 | 170 | 130 | 158 | 153 | 137 |
| Prices of— | | | | | | |
| Steel plates . . . . | 135 | 143 | 139 | 152 | 126 | 117 |
| Sections . . . . . | 142 | 150 | 134 | 133 | 128 | 119 |
| Rivets . . . . . . | 200 | 145 | 125 | 117 | 166 | 124 |
| Shipyard Wages— * | | | | | | |
| Skilled . . . . . . | 143 | 200§ | 125 | 252 | 206 | 212 |
| Semi-skilled . . . . | 173 | 221§ | 119 | 245 | 223 | — |
| Unskilled . . . . . | 188 | 212§ | 126 | 238 | 236 | 215 |
| Cost of living . . . . | 175 | 159 | 127† | 153 | 253 | 167 |

## INCREASED SHIPYARD COSTS.

It may be of interest to refer to Table XVI., which gives the percentage increase since pre-war days in various representative items of shipyard finance. The information has been collected from reliable and independent sources, but it is obvious that the figures can

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* Time-workers only. For an equivalent number of hours to those worked in pre-war days.

† On "Rentenmark" basis.

§ Assuming an equivalent reduction in number of working hours per week to that which has taken place in European countries.

only be approximate, and that only the very broadest comparisons can be drawn as between country and country. Particularly is this true of the figures for the selling price of cargo tonnage, since the information is for different types of ship; Germany, for instance, never built to any great extent the ordinary cargo tramp with a bare specification, which is the base of the United Kingdom figure. Since labour costs have increased so enormously since the war, it is obvious that a type of boat requiring a greater amount of labour than the plain cargo tramp will show a greater percentage increase in cost.

The three items for steel costs represent some 95 per cent. of the total amount of steel in the ship, and since the proportion of each is approximately known, it is possible to calculate a composite figure which will represent the increase in steel cost for a ship in each of the countries shown. The calculated figures are as follow:—

| | Percentage increase in cost of steel in ordinary cargo ship. |
|---|---|
| United Kingdom | 139 |
| United States | 145 |
| Germany | 138 |
| Holland | 147 |
| Norway | 128 |
| Sweden | 118 |

It should be mentioned that in Sweden it is the custom to use imported material, usually from Germany, rather than Swedish steel, which is 25–30 per cent. higher in cost than the figure given above.

By allowing for the relative amount of each class of labour employed in building a ship, it is possible to calculate a similar composite figure for the increase in labour costs; the figures are given below:—

| | Percentage increase in approximate wage bill per week, in ordinary ship construction. |
|---|---|
| United Kingdom | 161 |
| United States | 209 |
| Germany | 125 |
| Holland | 247 |
| Norway | 217 |
| Sweden | 213 |

It may, perhaps, be said that prior to the war the cost of the material worked into a ship about equalled the wages bill for the vessel; to-day it is safe to say that the wages cost is at least twice the material cost, and may be greater. Taking two to one as a conservative basis, and regarding the steel costs and timeworker wage costs as representative, a rough guide to the percentage increase in shipyard costs is as given below:—

| | Shipyard Costs. | Selling Price. |
|---|---|---|
| United Kingdom | 154 | 111 |
| United States | 188 | 170 |
| Germany | 129 | 130 |
| Holland | 214 | 158 |
| Norway | 187 | 153 |
| Sweden | 181 | 137 |

The favourable position of Germany will at once be seen, but it is to be remembered that taxation and other financial difficulties do not enter into the above comparison, and while undoubtedly Germany is to-day in a favourable condition, the difference is not quite so marked as the above figures would imply.

## II.—THE INTERNATIONAL SHIPPING CONFERENCE.

The circumstances leading up to the calling of the first International Shipping Conference by the Chamber of Shipping of the United Kingdom and the Liverpool Steamship Owners' Association in November, 1921, were explained at some length in last year's "Annual." Detailed reference was also made to the work of the various Conference committees, more particularly in connection with the loadline question, the subdivision of passenger steamers, and the carriage of deck cargoes of wood.

At the time the chapter referred to was written it was certainly hoped that the regulations for the first two of the subjects mentioned above were in such shape that by now they might have been embodied in the laws of this country. But it was not to be: fate or political expediencies have from time to time interposed, and have postponed the efforts made by the shipowners towards universal sea law irrespective of nationality, so far as the ship herself is concerned.

The chapter of last year's "Annual" indicated that one of the difficulties of international codes of good conduct would probably be in getting them adopted by the national legislatures. Time was when the government authorities were of the opinion that shipowners were not so alive to the interests of safety as they ought to be, and that improvements were only made under compulsion by the State. The meeting of the Second International Shipping Conference, held in London in May, 1924, certainly showed that all members of the shipping industry—and there were 14 nations and colonies represented—have realized to the full that the efficiency and safety of the ship is highly necessary to their well-being.

The deck cargo question has not as yet received that early consideration by the Board of Trade which was expected. It was referred to the Merchant Shipping Advisory Committee, which is the statutory body appointed to consider all new regulations. As far as can be learnt, the Advisory Committee has not yet discussed the question, and the date of any State decision on this matter must be very problematical, although the reports and evidence of the Shipping Conference have now been available for over a year. As Sir Alan Anderson, K.B.E., the President of the Conference, remarked in his opening address: "If we are right, our proposals (for the carriage of wood deck cargoes) would at once increase the safety of life at sea and enable ships to carry larger cargoes, thus tending to cheapen timber and to assist this and other countries to obtain cheaper houses."

It is interesting to record that very many and influential bodies have supported the proposed deck-cargo regulations, prominent among whom are Underwriters—the Committee of Lloyd's, Lloyd's Underwriters' Association, and the Institute of London Underwriters have all expressed their support. Various trade federations using timber, such as the mining and building trades, have also given their views on the economic advantages to this country of the proposed legislation, while the Deck Cargoes Committee of the International Labour Office have given the scheme their approval.

It is realized that to amend the Merchant Shipping Act, which is necessary in order to give effect to the regulations proposed by the Shipping Conference Committee, is more difficult than to amend regulations to administer an Act, which is possible in the case ot Loadline and Subdivision. It is, however, to be hoped that the British Board of Trade will use every endeavour—as they have promised to do—to afford a speedy and fair consideration to a much-needed reform.

## New Shipping Problems.

The International Shipping Conference of 1924, which was held under the presidency of Sir Alan Anderson, had before it several new problems, most of which rather affected the trading aspect than the ship herself. There was, however, one new subject which dealt with the ship herself, and that was the question of tonnage measurement. The Conference appointed a committee " to consider and report whether international arrangements could be made for a certificate of measurement for tonnage, such certificate to contain the measurement capacity of each section of the vessel both above and below the tonnage deck."

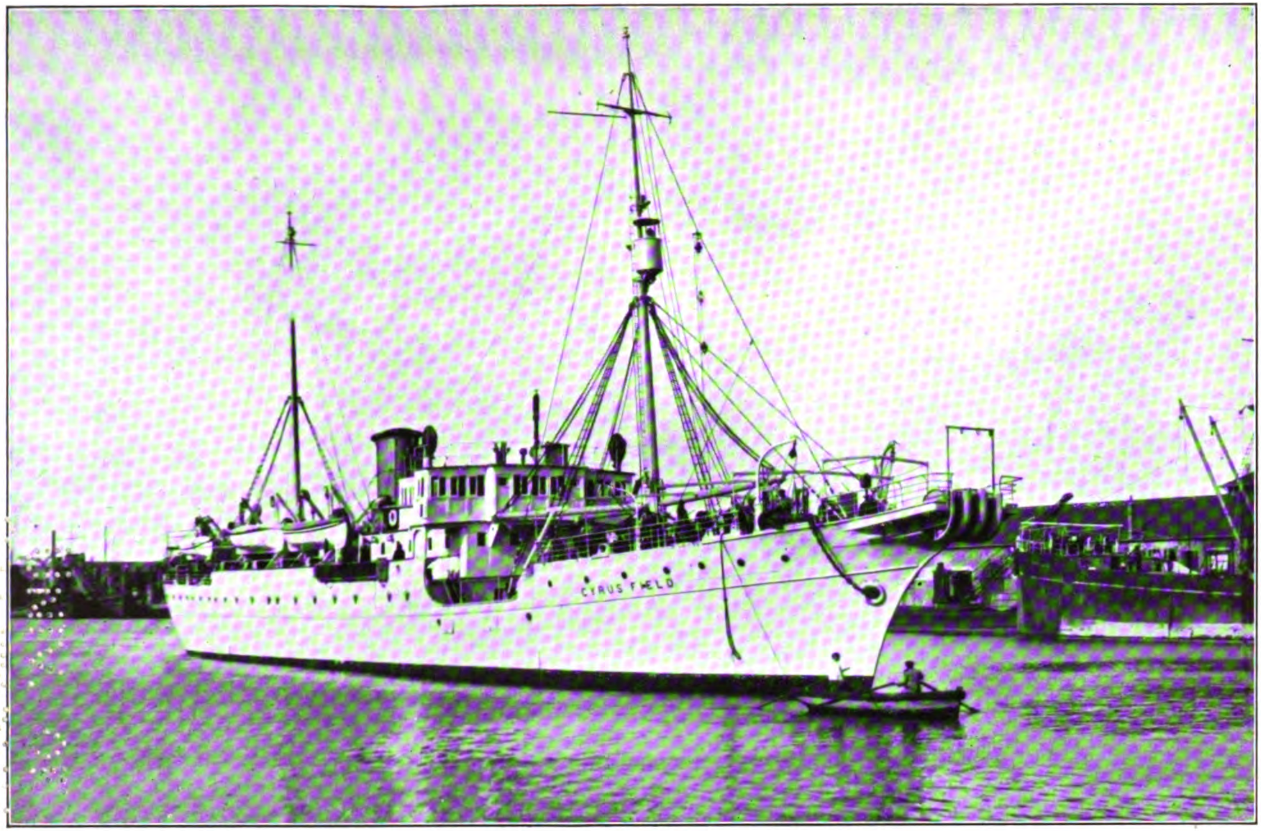
This committee reported generally on the question, and unanimously agreed as follows :—

1. That it is desirable that the cubic measurement of all spaces on ships should be ascertained on a form common to all authorities, and that all authorities should accept the measurements ascertained in any country without requiring re-measurement.
2. That the method of ascertaining the cubic measurement should, in the opinion of the committee, follow the principles of the Moorsom system, but that the details should be considered and reported upon by a special technical committee.
3. That it is not yet desirable to attempt any uniform assessment of tonnage except as stated above by the common acceptance of the measurements upon which all tonnage assessments shall be based.

It was also pointed out that all nations should agree on the same method of applying the proposed rules.

It is evident that a sub-committee will have to draw up the details of a scheme, and that it may be possible gradually to build up a universally acceptable practice in regard to the important question of tonnage measurement.

As all who are concerned with shipping realize, this subject is a very thorny one, and apparently there are very great differences between the points of view of national, shipowning, harbour and canal authorities. As between nations, there is not, however, a great deal of difference, such as there is between international practice and the practice of the Panama and Suez Canal authorities, who keep their tonnage measurements high in order to make their canal dues per ton appear low. If these two bodies could agree to accept the average national measurement, a great step forward



CABLE STEAMER CYRUS FIELD, OF THE WESTERN-UNION TELEGRAPH COMPANY.

*(Constructed by the Chantiers et Ateliers de St. Nazaire.)*

would have been taken towards unanimity in international tonnage measurement.

### INFLUENCE OF THE LEAGUE OF NATIONS.

The League of Nations has been helping the sea branch of international understanding by the appointment, in March, 1924, of a Committee for Communications and Transit, which further appointed a special sub-committee for the consideration of Maritime Navigation. This sub-committee has also considered the same work as the International Shipping Conference, and, as far as can be gathered, will endeavour to do its utmost, with the League of Nations, to support the international work which has been already well begun. Their assistance in the work of placing the necessary regulations on the Statute Books of the various nations will be more than welcomed by the maritime countries of the world.

The International Shipping Conference has come to stay; its first meeting was held in November, 1921, and its second in May, 1924. The Reporting Committee analysed the work of the first conference and its committees. They summarized the methods adopted to carry into effect the resolutions of the first conference, which, in the main, were based upon reliance on the genuine and impartial work of the committees themselves and on the efforts of the national organizations to exercise influence on their various Governments. They recommended that the reporting committee should be kept in existence, to be charged with a general supervision over the calling of the next conference, including the organization appertaining thereto. They also recommended that every national organization should, as was found necessary, be represented on the reporting committee. These views found favour with all the nations, who agreed that in future all expenses should be shared *pro rata* by the shipping organizations concerned.

With congratulatory speeches, this second international conference passed on its way, having left behind a full record of stepping stones as landmarks to that complete international understanding which must one day arrive as the results of the labours of those sea-adventurers who to day, as three centuries ago, are laying down the paths for the development of civilization.

## III.—PROGRESS OF THE FLEETS.

### GREAT BRITAIN.

The total amount of British shipping laid up in this country fell from 605,585 tons on January 1, 1924 (compared with 671,886 tons on January 1, 1923) to 391,337 tons on April 1, 1924, but rose again to 447,622 tons on July 1, last. Although this amount is much less than that laid up last year, the employment in which the bulk of the cargo carriers of this country is at present engaged leaves little, if any, margin of profit, in spite of most rigid economies in every direction.

Freights are still at a very low level, while no substantial improvement has taken place in the trade position. This has naturally reacted on the financial position of the shipping companies, and it is significant that, for the year ended June 30, 1924, only just over 1½ million pounds was invested in shipping concerns, as compared with 2½ millions in chemical works, and 4¾ millions in textile enterprises. On the other hand, the shipbuilding position has slightly improved, at any rate as regards output, although it is to be feared that some shipbuilding firms are feeling the strain of the long depression very acutely. There have unfortunately been several labour troubles during the past year, notably the boilermakers' dispute, and the preceding remarks regarding wage and financial difficulties will be seen to apply with special force to the position in this country. A certified statement recently published by Messrs. Swan, Hunter and Wigham Richardson, Ltd., shows that over nine contracts accepted during 1923 the cost, including a due proportion of overhead charges, was £324,843, and the price received only totalled £316,213 for the nine vessels—a direct loss of £8,630.

An interesting summary of the post-war position was given in the recently published Award of the Board of Arbitration which inquired into the application of the Federation of Engineering and Shipbuilding Trades for an increase of 10*s.* per week to timeworkers, and an equivalent advance to pieceworkers, employed in shipyards and repair establishments. The Award, issued on June 6th, 1924, contains the following *résumé* :—

> During the war and for a short period after the Armistice, the Shipbuilding and Ship-Repairing Industry was very busy and the war advances to time or day workers amounted in 1920 to 39*s.* 6*d.* per week, plus a bonus of 12½ per cent. on earnings, over pre-war rates. The pieceworkers had at that time a war advance of 26*s.* 6*d.* per week plus 25 per cent. on prices plus a bonus of 7½ per cent. on earnings. Many of them had, in addition, other advances such as what was known as the Standard Ship Cycle of Advances, which consisted of amounts varying from 10 per cent. upwards.
>
> In 1921, and more particularly towards the end of that year, a change had come over the industry. The work on hand was being finished or stopped, few or no new orders were coming in, repair work was being largely diverted to foreign yards and the industry was gradually drying up.
>
> The 12½ per cent. bonus to timeworkers and the equivalent 7½ per cent. bonus to pieceworkers and an advance of 6*s.* per week and 15 per cent. on prices were in due course withdrawn. Towards the end of 1921 and the beginning of 1922, the Standard Ship Cycle of Advances were greatly reduced and in some cases withdrawn, and in the spring of 1922, 16*s.* 6*d.* per week of the war advances was also withdrawn. This left the war advances of the time or day worker then payable as 17*s.* per week and the war advances of the pieceworker as 10*s.* per week plus 10 per cent. on piece prices, apart from what remained of the Standard Ship Cycle of Advances. The sum of 7*s.* per week of the timeworkers' advances, representing the first war bonus of 4*s.* awarded in 1915 and 3*s.* awarded in 1916 to time or day workers by the Committee on Production, was placed on the base rate and ceased to be regarded as a bonus, and the 10 per cent. on piece prices awarded in 1915 by the Committee on Production to pieceworkers, was likewise added to the piece prices and ceased to be regarded as a bonus. This left a flat war advance of 10*s.* per week payable alike to the time or day worker and the pieceworker.
>
> This war advance of 10*s.* per week was withdrawn in four equal instalments between November 1st, 1922, and January 3rd, 1923, save in the cases of certain of the lower paid non-skilled and semi-skilled men. Under the scheme, no part of the 10*s.* was withdrawn from any one receiving a weekly wage up to and including 37*s.* 6*d.*, and it was withdrawn from weekly wages of 38*s.* 6*d.* to 52*s.* 6*d.* at the rate of 8*d.* in the 1*s.*, and from weekly wages of 52*s.* 6*d.* per week and upwards the full 10*s.* was withdrawn. The wage of 37*s.* 6*d.* per week was made up of the pre-war rate and 7*s.* and 10*s.* per week war advances granted during the war.

The result of the application of this reduction is that, so far as general or national advances are concerned, the craftsman on day work is only 7*s*. per week better off than he was in 1914, and the pieceworker 10 per cent. on piece prices. It may be observed that, when the last of the above reductions took effect, the cost of living was about 80 points above the level of August, 1914, and it now stands at 71.

These reductions were made in the main to save and revive the industry, and all the workpeople have made great sacrifices with this object in view, more particularly the craftsmen and semi-skilled men.

Apart from reduced wages, many of the workpeople did not have full employment, due to interruption through weather conditions and the general nature of their calling. The amount of lost time since the last reduction in wages is difficult to calculate, but it is safe to say that it was considerable, when taken in conjunction with periods of unemployment.

Craftsmen generally in shipbuilding are at present receiving 10*s*. per week less than craftsmen in the allied industry of engineering, and joiners, plumbers and painters in a number of districts are receiving £1 per week less than the same craftsmen are receiving in the building trades. At the hearing, attention was also directed to the relatively high rates of wages payable in occupations and trades not subject to foreign competition.

The state of the industry has likewise been a matter of serious concern for the employers. In an endeavour to keep the industry going, they have entered into contracts without thought of profit and, in some cases, with the certainty of direct loss. Of 59 contracts on new work completed by members of the Executive Committee of the Shipbuilding Employers' Federation since June, 1922, the sum of £233,000 has been lost, and, of 83 contracts on new work not yet completed, it is estimated that, on the basis of the continuance of the present wages, there will be a loss of £785,000. These figures are startling. The yards being only partially employed, the employers have incurred further liabilities. It is not to be understood that these contracts were a speculation which turned out badly; they were undertaken, in many instances, with a view to keeping the industry alive.

With this information before them, the Board of Arbitration could not but come to the conclusion that "firms cannot go on incurring losses nor can workpeople go on working at the present wages." The ultimate decision of the Board was that 7*s*. of the 10*s*. per week war advance withdrawn between November 1st, 1922, and January 3rd, 1923, was to be restored, in two instalments, to those workers from whom the full 10*s*. was withdrawn, and an equivalent proportion in the case of workers from whom the full 10*s*. was not withdrawn. The second instalment is to be restored as from the beginning of the first full pay following September 20th, 1924, and the wages of timeworkers will then be:—

| | Pre-War. | October, 1924. |
|---|---|---|
| Skilled . . . . . . . . . | 41*s*. 6*d*. | 55*s*. 6*d*. |
| Semi-skilled . . . . . . . | 27*s*. 6*d*. | 41*s*. 6*d*. |
| Unskilled . . . . . . . . | 23*s*. 6*d*. | 38*s*. 6*d*. |
| No. of hours worked . . . . | 54 | 47 |

Inevitably, this decision means an added loss on the contracts already in hand, and it cannot be gainsaid that shipbuilding companies will need to be in a very strong financial position to be able to carry on during the period which must still elapse before any decided revival takes place.

This remark is equally true, of course, of the shipping industry, and in this connection it is interesting to note the tendency towards combination which is a post-war development of some importance. About 8,200,000 gross tons, or almost half of Great Britain's overseas-trading fleet, is to-day owned or controlled by six shipping companies taken together. It remains to be seen whether this movement, which largely arises by reason of the necessity for a strong financial position during the post-war trade depression, will ultimately be helpful to the industry, or the reverse.

While this country's shipping and shipbuilding position is, on the whole, somewhat better than last year, yet the situation is fraught with numerous difficulties and dangers, and resolute action and co-operation will be necessary, if they are to be surmounted.

## THE UNITED STATES.

Writing twelve months ago, there was before us the definite suggestion of Mr. Albert D. Lasker, then Chairman of the United States Shipping Board, to "scrap" 1,050 vessels in order to rid "the shipping business of a disturbing influence." That, at any rate, was a definite and concrete policy, but while as before different political expedients of various characters have been put forward during this year, the policy to-day is more vague than it was a year ago.

It is of interest to compare the declarations of the Republican and Democratic parties in connection with the Congressional elections; they are as follows:—

| REPUBLICAN. | DEMOCRATIC. |
|---|---|
| The Republican Party stands for a strong and permanent merchant marine built by Americans, owned by Americans, and manned by Americans, to secure the necessary contact with world markets for our surplus agricultural products and manufactures, to protect our shippers and importers from exorbitant ocean freight rates and to become a powerful arm of our national defense. | We declare for an American-owned merchant marine, American built and manned by American crews, which is essential for naval security in war, and is a protection to the American farmer and manufacturer against excessive ocean freight charges on products of farm and factory. |

These statements seem identical, but both are devoid of any idea of policy in carrying out the declaration. The Republicans believe in maintaining Government operation only until private ownership is strong enough to take over; the Democrats call for direct Government operation without obstructing the development and growth of private ownership. It is clear from these political statements that the American merchant marine, or for that matter any other merchant marine, is not likely to be kept alive by words, or by money, unless there is sufficient economic justification for its existence.

The facts are sometimes more enlightening than election "planks." On July 1st, 1920, there were 2,541 American ships engaged in foreign trade—on May 1st, 1924, there were only 1,910. And that is not all, for the only vessels engaged in foreign trade at the latter date were those operated by the Shipping Board, the private American owner having been driven off the high seas by the action of his greatest rival—the Shipping Board. The vessels engaged in coasting trade at the periods given above increased from 863 to 1,438—practically the whole of the number which had to be diverted from the overseas trade.

are, however, still very high in Japan, and the exchange rate is still low.

## SPAIN.

It has been seen that Spain increased her steel and iron steam and motor merchant fleet from 883,000 gross tons in 1914 to 1,163,000 gross tons at the end of June, 1924. The increase is primarily due to the great prosperity enjoyed by the Spanish mercantile marine during the war period, when the German submarine campaign was within an ace of success, and Allied, and even neutral, vessels were being torpedoed faster than they could be replaced. As the logical outcome of this prosperity, Spain, which before the war never took any great part in shipbuilding, developed several new shipbuilding establishments, which were encouraged by a Government bonus, and by the introduction of British capital. These new establishments were carried on successfully until the great post-war slump, but when that came the newly-established yards, having very small reserves, were forced to close down. The annual output of tonnage in Spain since pre-war days is shown below :—

| Year. | Gross tons. | Year. | Gross tons. |
|---|---|---|---|
| 1912 | 4,260 | 1918 | 17,389 |
| 1913 | 8,488 | 1919 | 52,609 |
| 1914 | 5,163 | 1920 | 45,950 |
| 1915 | 12,765 | 1921 | 47,256 |
| 1916 | 10,847 | 1922 | 7,776 |
| 1917 | 22,777 | 1923 | 4,488 |

The decrease since 1921 has been viewed with considerable apprehension in Spain, and a Decree has now been issued, dated February 16th, 1924, which provides for a comprehensive series of bounties to encourage shipbuilding in that country. The decree sets up a sliding scale based on the speed, nature of construction, and contemplated employment of the vessels. Four hundred and seven pesetas per gross ton are to be granted in the case of steel passenger steamers, with an additional 10 per cent. for every knot of speed exceeding 14 knots obtained on a trial trip when running with a half load. For the intermediate type of combined cargo and passenger carriers, there is a general rate of 398 pesetas per ton; while for ordinary steel cargo vessels the grant is 235 pesetas. One hundred and eighteen pesetas are to be awarded in the case of wooden sailing vessels or barges exceeding 100 gross tons, and 176 pesetas for steel barges, lighters, scows, and dredgers. The total amount of bounty to be used varies according to whether the tariff on shipbuilding materials is raised or lowered. The new tariff has very considerably increased the duties on such materials, and, as a result, about eight million pesetas are made available for the shipbuilding bounties.

It will be observed from Table VI. that over 43 per cent. of Spain's merchant fleet is over twenty-five years of age, and it is to be anticipated that the effect of the new bounty decree will be the construction of a considerable amount of new small tonnage for use in the extensive coastal trade of that country.

### HOLLAND.

In this country also attempts have been made during the past year to subsidize shipping and shipbuilding. Subsidies amounting to no less than 7,000,000 guilders have been granted to the Royal Holland Lloyd Company by the Dutch Government and the Municipality of Amsterdam, to enable that company to meet its liabilities. The view was taken that, although the present position of the company was precarious, yet if it were wound up the probable effect would be the removal of the terminal of an essential passenger steamship line from Amsterdam to a foreign port, which would have very bad effects on the general trade position of Amsterdam itself, and indeed of the whole country, by reason of increased unemployment. This subsidy can hardly be regarded in the same light as the efforts which are being made in other countries, and it may be described as merely a temporary expedient. But it is curious to note how in very many countries deliberate attempts—which will in the long run certainly be fruitless—are being made to foster shipping by either subsidy or flag discrimination.

Shipbuilding subsidies have also been granted in Holland during the past year, and these are of more importance, although their seriousness must not be over-estimated. The Government view, apparently, is that it is better by subsidies to enable the shipbuilding industry to compete in the world market, than to provide direct aid in the form of unemployment relief. It is only fair to say, however, that there is considerable opposition among the Rotterdam shipbuilders themselves to such a policy, even though their position is rendered difficult by reason of excessive taxation.

### TURKEY.

At the beginning of this year, legislation became operative whereby coastal trade was limited exclusively to vessels under Turkish registry, somewhat on the lines of the United States laws which make the coasting and Philippine Islands trades a "preserve" of American tonnage. It would appear that this legislation may have the immediate effect of increasing Turkey's fleet of small coasting vessels, but it is doubtful whether her total fleet, now only about 50,000 tons, will recover to its pre-war level of about 110,000 tons, for some years to come. Apart from the coasting trade, the future of the Turkish merchant fleet is necessarily dependent upon the development of her industrial resources.

### NORWAY.

The chief item of interest during the past year has been the continued State attempt to interfere in marine insurance. The original scheme for compulsory insurance with a Government Bureau was dropped in March, 1923, after urgent protests by both underwriters and shipowners. In November, 1923, a new proposal was put forward, which sought to provide a 50 per cent. compulsory cover in a Government Bureau. This proposal was also vigorously resisted, and in June, 1924, a new scheme was brought forward, this time proposing that 40 per cent. of the tonnage should be compulsorily insured. The Norwegian interests concerned are almost unanimously against the plan, and naturally a great deal of uncertainty prevails as to the future of Norwegian shipping until the matter is disposed of. If such a proposal became law, it would undoubtedly create a most dangerous precedent, and, for that reason, the course of events should be closely watched by the whole of the world's shipping industry.

WESTCOTT ABELL.

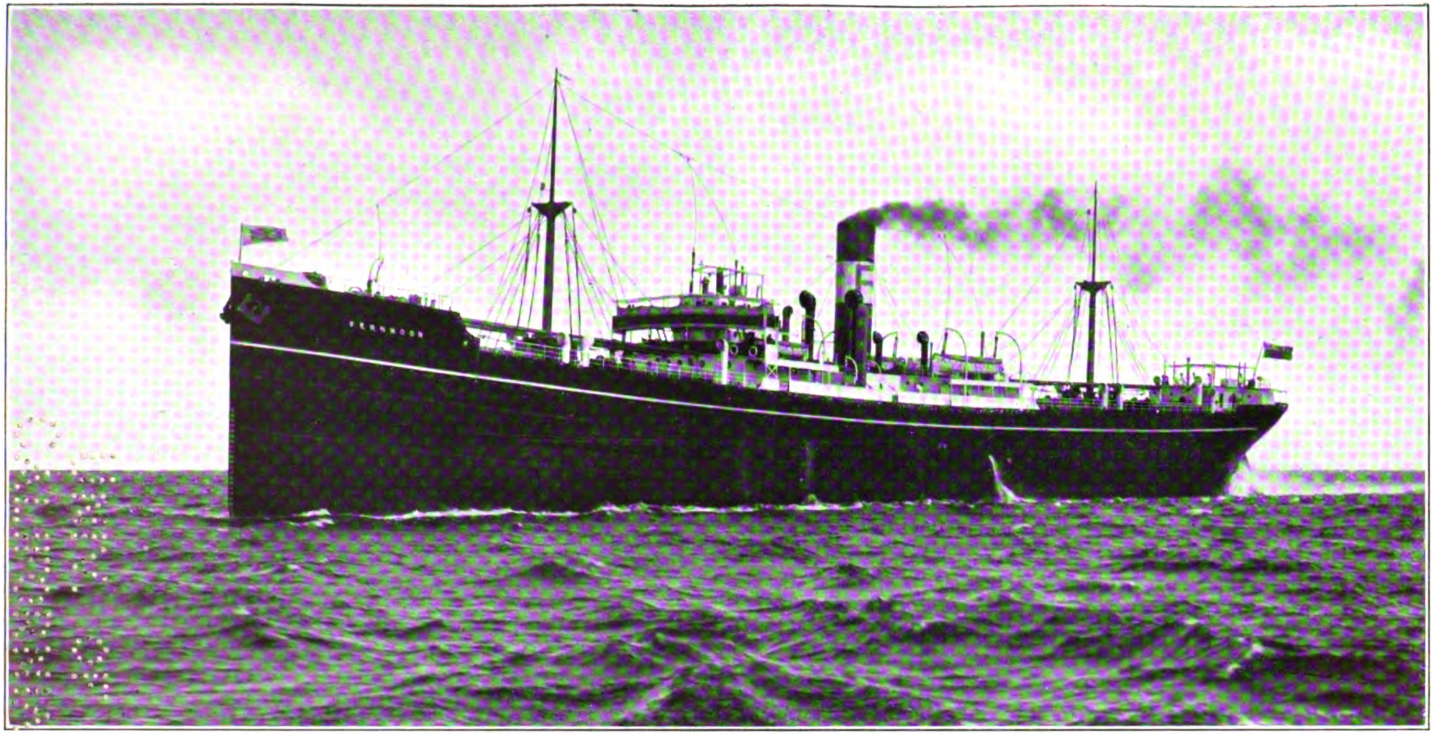
# CHAPTER II

## THE DEPRESSION IN FREIGHTS.

"THE days of large increase," which shipowners hoped were due after three years of the worst depression ever experienced, have failed them again in 1924. Promise of revival certainly appeared to "gild with a gleam of distant day" the darkness of the winter months, but the promise was not fulfilled. The apparent revival of the spring proved to be elusive. The three years of depression extended into four, and once more "disappointment" must be writ large on the tablets of the year. But it is disappointment still strangely blended with hope. "Man never is but always to be blest," surely is very true of man, the shipowner.

### TRADE SUPPRESSION.

The course of events during the first half of the year makes it plain enough that the world was suffering more from trade suppression than trade depression. The tide had actually begun to turn; trade improvement was on the way, however haltingly. But it was checked before the year had reached its fourth month, and about midsummer appeared to come to a standstill for the time being. It is apparent now that the reason was political rather than commercial, and for the prime political cause we must look to M. Poincaré's obdurate Ruhr policy, which kept England and France from uniting to settle the German reparations problem, throwing the European exchanges into still worse disorder and checking the purchasing power of most of the European states. Everywhere stocks of manufactured goods, raw materials, and foodstuffs were short after the depression; everywhere production was struggling to increase its output of commodities and cheapen its prices; but everywhere money was unstable, credit crippled, and buying and selling difficult. Labour troubles and heavy taxation, of which Great Britain had had more than her share, no doubt made expansion difficult and reduced her competitive power among the nations, but the main issue was that international trade could not move forward, as it was ready to do, until the oppressive German reparations question was settled and economic stability was restored to Europe. That is the outstanding economic fact of the year. It explains much and, in particular, why shipping freights failed of their first promise and sank back at mid-year to figures that were no better than the worst of 1923.



S.S. FERNMOOR OF THE MOOR LINE (W. RUNCIMAN & CO., LTD.)

(*Constructed by the Northumberland Shipbuilding Co., Ltd.*)

### MOVEMENT OF STAPLE COMMODITIES.

How trade in the bulk has struggled to make headway, only to be constantly frustrated by forces beyond control, is indicated in the trade and navigation returns, though to demonstrate the proposition thoroughly would require an analysis of the statistics of all the leading maritime states. Nevertheless, the British figures are sufficiently typical to serve the purpose. Table I. has been prepared, therefore, to show the quantities of staple commodities which have been carried overseas from and to the shores of this country during the first half of the year compared with the same period of 1923:—

TABLE I.—BRITISH OVERSEAS TRADE.

| | Six Months (Jan.—June). | | Increase or Decrease. |
|---|---|---|---|
| | 1924 | 1923. | |
| **EXPORTS:** | | | |
| Coal, tons . . . . . . . . | 31,131,057 | 39,880,881 | −8,677,824 |
| Coke, tons . . . . . . . . | 1,339,624 | 1,493,966 | −154,342 |
| Iron and steel, tons . . . . | 2,024,549 | 2,215,643 | −191.094 |
| Cotton piece goods, sq. yds. . . | 2,224,012,700 | 2,106,868,600 | +117,144,100 |
| Woollen tissues, sq. yds. . . . | 75,503,000 | 69,365,500 | +6,137,500 |
| **IMPORTS:** | | | |
| Grain and flour, cwts. . . . | 89,131,543 | 85,813,849 | +3,317,694 |
| Meat, cwts. . . . . . . . | 15,437,436 | 16,748,361 | −1,310,925 |
| Soft timber and pitwood (loads) | 2,726,839 | 3,104,343 | −377,504 |
| Cotton (raw), centals . . . . | 6,852,389 | 5,416,717 | +1,435,772 |
| Wool (sheep or lambs'), centals . | 5,187,770 | 5,223,675 | −35,905 |
| Iron ore, tons . . . . . . . | 3,091,564 | 3,306,754 | −215,190 |
| Iron and steel manufactures, tons . . . . . . . . | 1,171,621 | 665,237 | +506,384 |
| Sugar (refined), cwts. . . . . | 6,415,552 | 4,858,042 | +1,557,510 |
| Sugar (raw), cwts. . . . . . | 13,482,663 | 12,933,131 | +449,532 |
| Rice, cwts. . . . . . . . | 2,004,222 | 2,014,614 | −10,392 |
| Crude petroleum, galls. . . . | 189,589,135 | 146,495,842 | +43,093,293 |
| Petroleum (refined), galls. . . | 510,393,058 | 482,292,008 | +28,101,050 |

It will be seen that outward cargoes diminished all round, except for an increase in woollen tissues. There were over 8½ million tons less coal to carry, 154,000 tons less coke, 191,000 tons less iron and steel, but 117 million square yards more of cotton piece goods. In imports there was greater variation. There were over 3 million cwts. more grain and flour to carry, nearly a million and a half centals more of raw cotton, 500,000 tons more iron and steel, a million and a half cwts. more of refined and nearly 500,000 cwts. more of raw sugar, and heavy increases of 43 million gallons in crude petroleum and of 28 million gallons of refined. On the other hand, meat, rice, wool, iron ore, and soft timber all fell short of 1923.

Figures relating to the chief foreign countries are only available for the first quarter of the year, and then not in quantities but in values, which are apt to be misleading. In general, they indicate some expansion in both imports and exports, but it is doubtful if this expansion was maintained over succeeding quarters. The figures, for what they are worth, as a guide, are: Imports—United States, £221,345,000, compared with £220,194,000 in the same period of 1923; France, £108,804,000, as against £94,460,000; Germany, £108,766,000, the values for 1923 not being available. Exports—United States, £251,801,000, as against £206,452,000 in 1923; France, £116,769,000, as against £89,073,000; British India (by sea), £78,639,000, against £61,198,000; and Germany, £74,607,000.

The serious decline in our staple exports is reflected in the navigation returns, which, as will be seen from Table II. annexed, show a decrease of nearly two million tons in the clearances of shipping from our ports, while the state of the import trade is indicated by an increase of nearly half a million tons in the entrances thereto.

TABLE II.—TONNAGE ENTRANCES AND CLEARANCES AT BRITISH PORTS.

| | Six Months (Jan.—June). | | Increase or Decrease. |
|---|---|---|---|
| | 1924. | 1923. | |
| | Tons. | Tons. | Tons. |
| Entrances . . . . | 15,214,558 | 14,743,280 | +471,278 |
| Clearances . . . . | 17,761,580 | 19,582,741 | −1,821,161 |

### DECLINING FREIGHT AVERAGES.

The demand for carrying tonnage naturally varied with these fluctuations in imports and exports, and freights were unable to maintain their stability. Taking the Chamber of Shipping averages over all as the best general guide, we find from Table III. that freights improved in the early months and fell away again from May on to July, which was the worst month of the year, recording a percentage nearly as low as the lowest of the first half of 1923.

TABLE III.—AVERAGE FREIGHTS.

| Month of Year. | 1924. Freights. | 1923. Freights. | 1924. Time Charters. | 1923. Time Charters. |
|---|---|---|---|---|
| January . . . . . . . . | 30·8 | 29·4 | 21·6 | 24·1 |
| February . . . . . . . | 31·6 | 28·9 | 24·1 | 23·9 |
| March . . . . . . . . | 32·1 | 29·4 | 24·3 | 23·7 |
| April . . . . . . . . | 31·1 | 32·2 | 23·9 | 23·9 |
| May . . . . . . . . . | 30·1 | 30·8 | 23·9 | 23·5 |
| June . . . . . . . . | 29·1 | 28·7 | 23·5 | 21·8 |
| July . . . . . . . . . | 27·4 | 27·6 | 21·7 | 20·9 |
| August . . . . . . . . | 27·8 | 25·0 | 20·9 | 20·2 |
| September . . . . . . . | — | 26·4 | — | 19·42 |
| October . . . . . . . . | — | 27·3 | — | 19·42 |
| November . . . . . . . | — | 27·3 | — | 19·42 |
| December . . . . . . . | — | 28·1 | — | 20·17 |

### FLUCTUATIONS IN LAID-UP TONNAGE.

It is interesting to note from Table IV. on the opposite page, how the laid-up tonnage in our ports fluctuated in keeping with the rise or fall in these freight averages, declining from 629,000 tons in January to 410,000 tons in April, the while the average increased from 30·8 per cent. to 32·1 per cent. and increasing again to 470,000 tons, with a fall in the average to 29·1 per cent. At the same time, it will be seen that, in this matter of laid-up shipping, the position in 1924 is much better than in the year previous when, except for a brief period in the spring, the idle tonnage always exceeded 700,000 tons.

TABLE IV.—LAID-UP TONNAGE IN BRITISH AND IRISH PORTS.

| | 1924. | | | 1923. | | |
|---|---|---|---|---|---|---|
| | Freight Averages. | Idle Vessels. | | Freight Averages. | Idle Vessels. | |
| | | No. | Net Tonnage. | | No. | Net Tonnage. |
| January | 30·8 | 317 | 629,763 | 29·4 | 411 | 732,198 |
| February | 31·6 | — | — | 28·9 | — | — |
| March | 32·1 | — | — | 29·4 | — | — |
| April | 31·1 | 225 | 410,365 | 32·2 | 321 | 546,555 |
| May | 30·1 | — | — | 30·8 | — | — |
| June | 29·1 | — | — | 28·7 | — | — |
| July | — | 310 | 470,073 | 27·6 | 372 | 709,102 |
| August | — | — | — | 25·0 | — | — |
| September | — | — | — | 26·4 | — | — |
| October | — | — | — | 27·3 | 395 | 755,101 |
| November | — | — | — | 27·3 | — | — |
| December | — | — | — | 28·1 | — | — |

## SMALLER DEMAND FOR COAL.

Of necessity, coal and grain have dominated the freight markets no less than in previous years, and the movements in these staple commodities go far to account for the variations in freights above noted. Coal and grain, therefore, demand a little consideration.

The outstanding fact of the coal export trade is the reaction after the boom of last year. With the cessation of passive resistance on the Ruhr, the output of the mines there gradually returned to normal. France, Belgium, and Italy received their regulation reparation deliveries, and Germany even had coal to spare for export from Rotterdam and Emden. Such a reversal of last year's conditions made a huge difference to our coal export business and shipments declined steadily as the year advanced, while prices fell to comparatively low figures in the summer.

Naturally, coasting freights were the first to feel the effect of this change, since there was so much less coal going to Germany, France, and Belgium, and it is a fact that freights for nearer European ports fell to pre-war figures before the end of the summer. Unfortunately, our coal exporters found it extremely difficult to make good their loss of trade with these countries in other markets, and exports over all tended to decline. Europe, as a whole, was not in a position to buy freely owing to monetary difficulties, while in the East, British coal found a successful competitor in South Africa, and, in the West, a persistent rival in the United States, which made a special bid for the South American markets, to which she sent more coal in the first half of 1924 than in the whole of the preceding year. The net result was a decline in British exports, for the half-year, to 31,131,057 tons, as compared with 39,808,881 tons for the same half of 1923, or in other words, where there were 79,449,678 tons of coal to carry from our shores in 1923, in 1924 the quantity is not likely to be more than 62,000,000 tons. With this much less employment for tonnage, coal freights fell steadily to all destinations, in some cases reaching nearly the pre-war level. In consequence, many steamers had to make their outward trips in ballast, and, when the homeward markets began to decline, it was no easy matter to earn a bare margin of profit on the round voyage.

Nor could shipowners recoup themselves to any extent in the American coal trade, for it was only in the early months of 1924 that the United States was able to compete effectively with British coal in the European market and, thereafter, their business was confined mainly to the South American countries. Thus American coal freights, equally with our own, drooped to very low figures.

## Representative Coal Freights.

Table V. on p. 201, recording the highest, lowest, and mean rates from Cardiff, the Tyne, and the United States, to representative ports for the years 1922, 1923, and 1924, shows that the highest rates in 1924 seldom equalled the highest of 1923, while the lowest rates were usually lower than the lowest of that year, giving reduced mean rates in most cases. It will be noticed that the lowest rates for 1924 are unmistakably down to pre-war figures, as for instance Cardiff—River Plate, 12*s.* 3*d.*; Las Palmas, 8*s.* 3*d.*; Havre, Rouen, 3*s.* 6*d.*; Tyne to London, 3*s.* 4½*d.*; Hamburg, 4*s.*; Genoa, 8*s.* 7½*d.*; Port Said, 9*s.* 6*d.*

## Grain Trade Restriction.

Grain, the staple homeward freight, has suffered from the monetary conditions of Europe. In the spring, there were signs of a revival in buying, but when the franc began its erratic course, purchases declined sharply, and the larger business which shipowners expected to do in Canadian, American, and Argentine grain did not materialize. May, June, and July proved to be most disappointing months, for not only was there a minimum of grain to be carried across the Atlantic, but the regular liners entered into competition with the freighters, and ended by carrying the bulk of the shipments from Montreal and New York during the summer months at what were little better than ballast rates. Heavy grain from the Northern Range to the Continent was taken as low as 5 cents to 8 cents per 100 lbs., and from Montreal down to 10 cents. Thus tramp steamers had practically only the River Plate market to fall back upon, until Vancouver and the North Pacific trade began to open out in the early autumn. In other directions, grain

### TABLE V.—HIGHEST, LOWEST, AND MEAN FREIGHT RATES, 1922, 1923, AND 1924.

| Ports. | 1922. | | | 1923. | | | (January–July) 1924. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Highest rate. | Lowest rate. | Mean rate. | Highest rate. | Lowest rate. | Mean rate. | Highest rate. | Lowest rate. | Mean rate. |
| | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. |
| COAL FREIGHTS— | | | | | | | | | |
| Cardiff to River Plate | 19 6 | 11 6 | 15 6 | 20 0 | 12 0 | 16 0 | 16 0 | 12 3 | 13 10½ |
| ,, Alexandria | 17 0 | 12 0 | 14 6 | 14 6 | 9 0 | 11 9 | 14 6 | 9 9 | 12 1½ |
| ,, Las Palmas | 12 6 | 8 9 | 10 7½ | 11 9 | 8 3 | 10 0 | 10 6 | 8 3 | 9 4½ |
| ,, St. Vincent | 12 9 | 9 3 | 11 0 | 12 6 | 8 9 | 10 7½ | 11 0 | 8 6 | 9 9 |
| ,, Barcelona | 16 0 | 12 4 | 14 2 | 17 6 | 12 0 | 14 9 | 14 6 | 10 6 | 12 6 |
| ,, Gibraltar | 12 0 | 6 6 | 9 3 | 12 0 | 5 6 | 8 9 | 10 3 | 7 9 | 9 0 |
| ,, Lisbon | 13 0 | 8 9 | 10 10½ | 12 6 | 8 3 | 10 4½ | 11 6 | 7 4½ | 9 5¼ |
| ,, Rouen | 8 6 | 5 0 | 6 9 | 9 1½ | 4 10½ | 6 9¾ | 7 6 | 3 6 | 5 6 |
| ,, Havre | 8 0 | 4 9 | 6 4½ | 8 9 | 4 6 | 6 7½ | 6 6 | 3 6 | 5 0 |
| ,, Montreal | 14 0 | 7 6 | 10 9 | 10 0 | 6 9 | 8 4½ | 10 9 | 7 3 | 9 0 |
| Tyne to Port Said | 16 6 | 11 6 | 14 0 | 13 6 | 9 9 | 11 7½ | 13 6 | 9 6 | 11 6 |
| ,, Genoa | 15 6 | 10 0 | 12 9 | 13 6 | 8 6 | 11 0 | 12 0 | 8 7½ | 10 3¾ |
| ,, Bordeaux | 10 0 | 6 3 | 8 1½ | 8 9 | 5 7½ | 7 2¼ | 6 6 | 5 3 | 5 10½ |
| ,, London | 7 3 | 3 7½ | 5 5¼ | 7 6 | 3 6 | 5 6 | 6 3 | 3 4½ | 4 9¾ |
| ,, Rouen | 9 0 | 4 9 | 6 10½ | 8 6 | 4 7½ | 6 6¾ | 6 9 | 3 7 | 5 2 |
| ,, Gothenburg | 9 3 | 7 4½ | 8 3¼ | 7 0 | 5 6 | 6 3 | 7 9 | 5 10½ | 6 9¾ |
| ,, Stettin | 9 6 | 5 3 | 7 4½ | 9 0 | 5 4½ | 7 2½ | 8 6 | 5 3 | 6 10½ |
| ,, Hamburg | 6 6 | 4 9 | 5 7½ | 9 6 | 4 6 | 7 0 | 5 10½ | 4 0 | 4 11½ |
| Northern Range to West Italy (coal) | — | — | — | $4.10 | $2.10 | $3.10 | $4.00 | $2.60 | $3.30 |
| ,, ,, Rio (coal) | — | — | — | — | — | — | $4.00 | $3.05 | $3.52½ |
| Hampton Roads to West Italy (coal) | $4.50 | $4.00 | $4.25 | $3.75 | $2.85 | $3.30 | $3.65 | $2.35 | $3.00 |
| ,, ,, Buenos Aires (coal) | $4.00 | $3.25 | $3.62½ | $4.65 | $3.10 | $3.87½ | $4.10 | $3.10 | $3.60 |

business similarly proved disappointing, shipments from the Danube and South Russia not being steady enough to support rates and those from the East and Australia being intermittent. In July, came news of a prospective world shortage of wheat, estimated at something like 500 million bushels, due to the cold wet spring, which interfered with sowing in Canada, the United States, and Europe. Russia found her export policy premature, for she is faced with a shortage which will leave her with little to spare for shipment. In view of these considerations, first grain and then wheat began to rise, mainly through American manipulation, and attention centred in the Argentine crop, which, as an exception, promised well, while large quantities of harvested maize awaited shipment in the River Plate ports. The promise was of a sharp demand for grain from Europe, while it seemed probable that the higher prices would induce selling and shipments as large as the harvests would permit. August, and especially September, saw this promise fulfilled, grain freights becoming active from the St. Lawrence, the Gulf, the River Plate, and Australia after the European settlement had been effected.

In other commodities, sugar has been rather prominent in view of the increasing demand for it in Europe and its rising price, and something more than the average quantity of tonnage has been employed in the Cuban and Mauritius trades; but the Java trade has been very quiet.

Iron ore, though quiet, has been in somewhat variable request and never very good, and only a moderate volume of tonnage has found an outlet in the Mediterranean and Bay trades, the supply of boats being nearly always more than adequate and rates did not long remain at remunerative figures. The iron and steel trades, however, are expanding slowly, and there is a prospect of fuller employment in the ore-carrying trade ere long.

## TIMBER DEMAND AND HOUSING.

Timber has been in most active demand owing to the house shortage in all the war-affected countries, and particularly in England. The Baltic has shipped larger quantities to this country and to Europe than in 1923; but, on the other hand, the depression in the coal trade lessened the demand for pit props. Owners continued to demand remunerative freights from Sweden and Finland, and, to some extent, they succeeded, though not wholly, while some trouble was experienced in establishing the "Scanfin" charter in July; the Hull importers, in particular, objected to its conditions. In the Canadian trade, a feature of 1924 was the growing export of pit props from Newfoundland to England. Business from the Gulf centred largely in the River Plate, as usual, at rates ranging from 165*s*. down to 142*s*. 6*d*.

In the early months of the year, as in the previous autumn, Japan continued to take considerable quantities of lumber and grain from the Pacific Coast of North America, as well as rice from the Rice Ports and a certain amount of wheat from Australia;

but the requirements of that country were soon satisfied and in the main Japanese tonnage was utilized for this business. The shipment of wheat from the North Pacific to China has been a feature of interest which promises to develop into a larger business soon.

Oil freights have again been good, but did not remain long at the best figures. In February and March, the rate from the Gulf to the United Kingdom reached 52*s*. 6*d*., but as the spring advanced began to droop and at mid-year was not more than 35*s*. Owing to the failing output of the Californian wells, the big trade between the west and east coasts of the United States, via the Panama Canal, which was such a feature in 1923, fell off to comparatively modest proportions during the year. The tanker tonnage building and contracted for has increased substantially of late—the total tonnage afloat being 5,193,704 tons on June 30, 1924—and it may be assumed that the day of high oil freights is over, though the demand for oil is such that steady and remunerative employment should be available in this trade for some time to come.

### MOVEMENT OF HOMEWARD FREIGHTS.

Table VI. on p. 204 shows the highest, lowest, and mean rates for the first half-year of 1924 compared with 1923, in the leading homeward markets. As a rule, but not invariably, it will be noted, the mean rates for 1924 were a little better than those of the preceding year, especially in grain freights, though in iron-ore freights they are lower and in time charters unaltered.

### WORKING COSTS.

One of the disabilities from which the shipping trade has suffered especially is that working costs have not fallen with the fall in freights. Bunker coal certainly has been cheaper, and during the summer and autumn months substantially cheaper, but, on the other hand, oil fuel has remained dear, standing at £4 7*s*. 6*d*. and £5 7*s*. 6*d*. a ton, respectively, for ordinary and Diesel-engine oil from March to July, when prices were reduced 5*s*. a ton, though by this time good Durham unscreened bunkers were down to 20*s*. a ton or less. September, however, brought another 5*s*. reduction, making ordinary standard oil £3 17*s*. 6*d*. and Diesel-engine oil £4 17*s*. 6*d*. a ton. Thus, in the second half of the year 1924, shipowners found a little relief in the cost of both coal and oil bunkers, though it was not commensurate with the fall in freights. On the other hand, wages rose, the National Maritime Board agreeing to an advance of 30*s*. a month for mates and engineers and 20*s*. for other ratings in the foreign trade, and 10*s*. and 6s. 6*d*., respectively, per week in the home trade, to take effect in two instalments, on June 5 and September 5. Prices for stores did not fall materially, while dock and port charges at many important British ports were increased owing to the advance in wages conceded to the dockers, with the result that British ports almost invariably compare disadvantageously with the leading Continental entrepôts. Insurance has, no doubt,

### TABLE VI.—HIGHEST, LOWEST, AND MEAN FREIGHT RATES, 1922, 1923, AND 1924.

| Ports. | 1922. | | | 1923. | | | (January–July) 1924. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Highest rate. | Lowest rate. | Mean rate. | Highest rate. | Lowest rate. | Mean rate. | Highest rate. | Lowest rate. | Mean rate. |
| HOMEWARD FREIGHTS— | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. | s. d. |
| Bilbao to Middlesbrough | 8 3 | 7 0 | 7 7½ | 9 0 | 7 0 | 8 0 | 8 3 | 7 0 | 7 7½ |
| Bordeaux to Bristol Channel | 11 6 | 6 4 | 8 11 | 11 3 | 9 0 | 10 1½ | 10 9 | 8 0 | 9 4½ |
| Rice Ports to U.K. or Continent | 25 0 | 22 6 | 23 9 | 39 0 | 22 6 | 30 3 | 36 3 | 28 9 | 32 6 |
| Bombay to U.K. or Continent | 27 6 | 17 0 | 22 3 | 32 6 | 22 0 | 27 3 | 30 0 | 20 0 | 25 0 |
| Java (sugar) to U.K. or Continent | 35 0 | 30 0 | 32 6 | 37 6 | 32 9 | 35 1½ | 36 3 | 27 6 | 32 10½ |
| Australia to U.K. basis | 52 6 | 35 0 | 43 9 | 45 0 | 30 0 | 37 6 | 47 6 | 30 0 | 38 9 |
| Alexandria to London or Hull, per 60 c.f. | 12 6 | 9 0 | 10 9 | 12 6 | 9 9 | 11 1½ | 11 6 | 10 0 | 10 9 |
| River Plate to U.K. or Continent | 37 6 | 16 0 | 26 9 | 29 3 | 11 0 | 20 1½ | 32 6 | 20 0 | 26 3 |
| Sundsvall to East Coast | 67 6 | 42 6 | 55 0 | 50 0 | 40 0 | 45 0 | 48 6 | 48 6 | 48 6 |
| Northern Range to U.K. (grain per qr.) | 5 3 | 2 0 | 3 4½ | 4 0 | 2 6 | 3 3 | 4 3 | 3 3 | 3 9 |
| Montreal to U.K. or Continent (grain per qr.) | 4 9 | 3 0 | 3 10½ | 4 9 | 2 1½ | 3 5¼ | 4 10½ | 3 0 | 3 11¼ |
| TIME CHARTERS— | | | | | | | | | |
| General trade (12 months) | 5 0 | 4 0 | 4 6 | 5 0 | 3 9 | 4 4½ | 4 9 | 4 0 | 4 4½ |

cheapened a little, but repairing costs have kept up owing to the advance awarded to the shipyard men by the Industrial Court, and these, indeed, have been such that many British ships have had their repairs and overhauls done on the Continent, especially at Rotterdam; in many cases, all but absolutely necessary repairs have been postponed to a more convenient day. Generally speaking, if freights have tended to fall back to pre-war figures, working expenses have been nearly double those of the pre-war period.

The world is still suffering from a shortage of trade and a plethora of tonnage. It is well in the circumstances that new building proceeds quietly. The present is a time of waiting, which calls for patience. Trade is improving slowly, but is not yet good. The world is over supplied with tonnage, not all of the best kind perhaps, but equal to doing the world's work with more or less efficiency, until the revival really eventuates. This revival, it is now seen, cannot come with a rush, even though the world is waiting for it. To build efficient ships, with or without internal-combustion engines, in order to replace those which are obsolete, is right, but to add more cargo-carrying tonnage to the markets merely in anticipation of a coming boom in trade is manifestly wrong. No rush of orders for new tonnage can be justified in the present state of world trade, and none indeed is likely. A quiet substitution of new ships for old, a strengthening of shipping companies' reserves, and preparations for action when the movement really begins—these are the essentials of a sound shipping policy to meet the exigencies of this interim period.

R. W. JOHNSON.

# CHAPTER III.

## STANDING OF THE WORLD'S MERCHANT FLEETS.

THE expansion of the merchant fleets of the world has been checked, and for the first time, apart from the war years, a decrease in tonnage has occurred. On the eve of the war, 49,089,552 tons of shipping was afloat, as compared with 28,957,358 tons in 1900. The rapid growth which was in progress when hostilities opened was arrested from 1915–18, but was resumed at an accelerated pace after the armistice, as the figures in Table I. reveal.

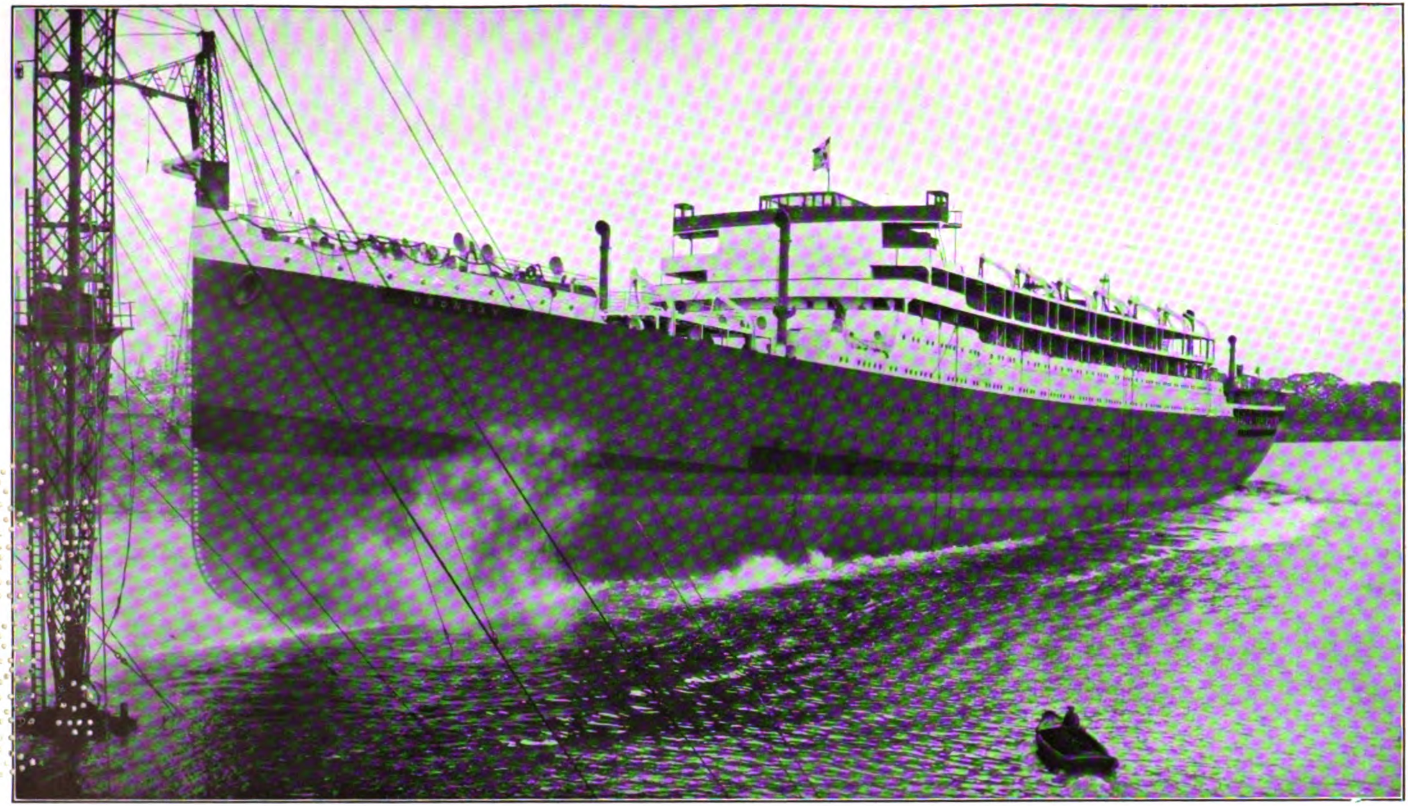
TABLE I.—TONNAGE OF THE WORLD.

| Year. | Steam. | | Sail. | | Total. | | Increase (+) or decrease (−) in million gross tons. |
|---|---|---|---|---|---|---|---|
| | No. | Gross tons. | No. | Gross tons. | No. | Gross tons. | |
| 1919 | 24,386 | 47,897,407 | 4,869 | 3,021,866 | 29,255 | 50,919,273 | — |
| 1920 | 26,513 | 53,904,688 | 5,082 | 3,409,377 | 31,595 | 57,314,065 | +6·4 |
| 1921 | 28,433 | 58,846,325 | 4,773 | 3,128,328 | 33,206 | 61,974,653 | +4·7 |
| 1922 | 29,255 | 61,342,952 | 4,680 | 3,027,834 | 33,935 | 64,370,786 | +2·4 |
| 1923 | 29,246 | 62,335,373 | 4,261 | 2,830,865 | 33,507 | 65,166,238 | +0·8 |
| 1924 | 29,024 | 61,514,140 | 3,932 | 2,509,427 | 32,956 | 64,023,567 | −1·1 |

The sailing ship is becoming of less and less importance in the carrying of the world's trade. In 1900 there were 11,942 sailers, whereas now there are only 3,932, and most of these ships are of small size.

## FAILURE OF GOVERNMENT FLEETS.

The fact that a decrease has to be recorded in the steam and motor tonnage indicates, first, the reaction of the freight position on the shipyards, and, secondly, the failure of the State merchant fleets, owing to causes which are familiar to all students of shipping affairs. It is now established beyond dispute that shipping cannot be nationalized, except at a heavy cost, direct and indirect, to the communities concerned. The taxpayers of the United States, Canada, Australia, France, Portugal and Brazil are all, in varying degree, the poorer owing to the experiments in this direction made in those countries after the conclusion of the war. The American taxpayers have suffered most seriously in this respect. Congress



LAUNCH OF THE ORIENT LINER ORONSAY FROM THE CLYDEBANK YARD OF MESSRS. JOHN BROWN & CO., LTD.

has, so far, failed to find an avenue of escape from what has proved to be a most costly adventure. The ships can neither be operated at a profit, nor sold at an economic price owing to the unhealthy influence of politics on American shipping generally and to the depression in the freight market. Experience has proved that shipping is an industry which can be conducted successfully only by shipowners of long experience, who understand their business and combine initiative and enterprise with judgment and caution.

## CARGO TONNAGE AVAILABLE.

The crude statistics of the shipping of all classes now afloat tend to convey a false impression of the amount of tonnage which is available for the carriage of cargoes in the ocean-going trades, as well as coastwise. If an estimate is to be reached of the tonnage which can be used for carrying passengers and cargoes, large deductions must be made from the aggregate totals in accordance with Table II.

TABLE II.—SHIPPING AVAILABLE FOR CARRYING GOODS.

| | No. | Gross tons. | No. | Gross tons. |
|---|---|---|---|---|
| Total tonnage of the world . . . | | | 32,956 | 64,023,567 |
| Sailing ships . . . . . . . . | 3,932 | 2,509,427 | | |
| Oil tankers . . . . . . . . | 943 | 5,193,704 | | |
| Trawlers and other fishing vessels . | 3,600 | 789,776 | | |
| Lake vessels, U.S.A. . . . . | 524 | 2,361,464 | | |
| „ „ Canada . . . . | 115 | 257,404 | | |
| | | | 9,114 | 11,111,775 |
| Ships available for passenger and goods transport . . . . . . | | | 23,842 | 52,911,792 |

Even this reduced total is misleading as a guide to the volume of tonnage which is available for ocean transport, since a large proportion of the vessels are comparatively small. According to Lloyd's Register, 18,500 of the steamers and motor ships on the Register are of less than 2,000 tons, accounting for 10,526,831 tons, and in that reduced total are included a large number of oil tankers and steamers on the Great Lakes of the United States and Canada. Allowance must also be made for the vessels hurriedly built during the war, which will never probably be again employed at sea. As Sir Westcott Abell points out in the chapter he contributes to this "Annual," 7½ million tons of ships are over twenty-five years old. It may be estimated that the excess of efficient tonnage over the amount available ten years ago—1914—is not more than two or three million tons. A general revival in trade throughout the world would speedily absorb this surplus, but in the meantime it is acting as a drag on the freight market.

## Relative Order of the Merchant Fleets.

The most noticeable change in the standing of the merchant fleets is the rise of Germany to the fifth place, whereas a year ago, as recorded in the " Annual " last year, she occupied the seventh place. She has now passed Italy and Holland. Apart from purchases made abroad, figures published in Germany show that that country built in the years 1922 and 1923, for its own account, 979,094 tons of seagoing vessels.

In Table III. the principal maritime countries are given in the order of their relative strength, the figures for 1923 and 1924 being supplemented by comparisons based on the figures for 1914.

Table III.—Sea-going Steel and Iron Steamers and Motor Ships owned by the Principal Maritime Countries.

| Order | Country. | June 1923. | June 1924. | Difference between 1924 and 1914. |
|---|---|---|---|---|
| | | Tons gross. | Tons gross. | Tons gross. |
| 1 | Great Britain and Ireland * | 19,077,000 | 18,917,000 | +40,000 |
| | British Dominions | 2,219,000 | 2,213,000 | +806,000 |
| 2 | America (United States) | 12,416,000 | 11,838,000 | +9,986,000 |
| 3 | Japan | 3,402,000 | 3,655,000 | +2,013,000 |
| 4 | France | 3,265,000 | 3,193,000 | +1,275,000 |
| 5 | Germany | 2,496,000 | 2,856,000 | −2,242,000 |
| 6 | Italy | 2,788,000 | 2,676,000 | +1,248,000 |
| 7 | Holland | 2,606,000 | 2,533,000 | +1,062,000 |
| 8 | Norway | 2,299,000 | 2,326,000 | +403,000 |
| 9 | Spain | 1,169,000 | 1,163,000 | +280,000 |
| 10 | Sweden | 1,092,000 | 1,146,000 | +154,000 |
| 11 | Denmark | 920,000 | 974,000 | +206,000 |
| 12 | Greece | 743,000 | 751,000 | −69,000 |
| 13 | Belgium | 600,000 | 555,000 | +214,000 |
| | Austria-Hungary | Nil. | Nil. | Nil. |
| | Other countries | 2,847,000 | 2,749,000 | +692,000 |
| | Total abroad | 38,862,000 | 38,613,000 | +14,976,000 |
| | World's Total | 57,939,000 | 57,530,000 | +15,016,000 |

## Coal and Oil.

Oil continues to displace coal in the mercantile marines, although many shipowners still consider that the problem of oil supplies is one which requires further consideration. Only just over 66 per cent. of the tonnage of the Merchant Marine now depends entirely upon coal, while in 1914 the percentage was nearly 89. Of the 3,347 steamers of 17,154,072 tons fitted for burning oil fuel, 680, of 4,342,417 tons, are registered in Great Britain and Ireland and 1,854 of 9,090,860 tons in the United States.

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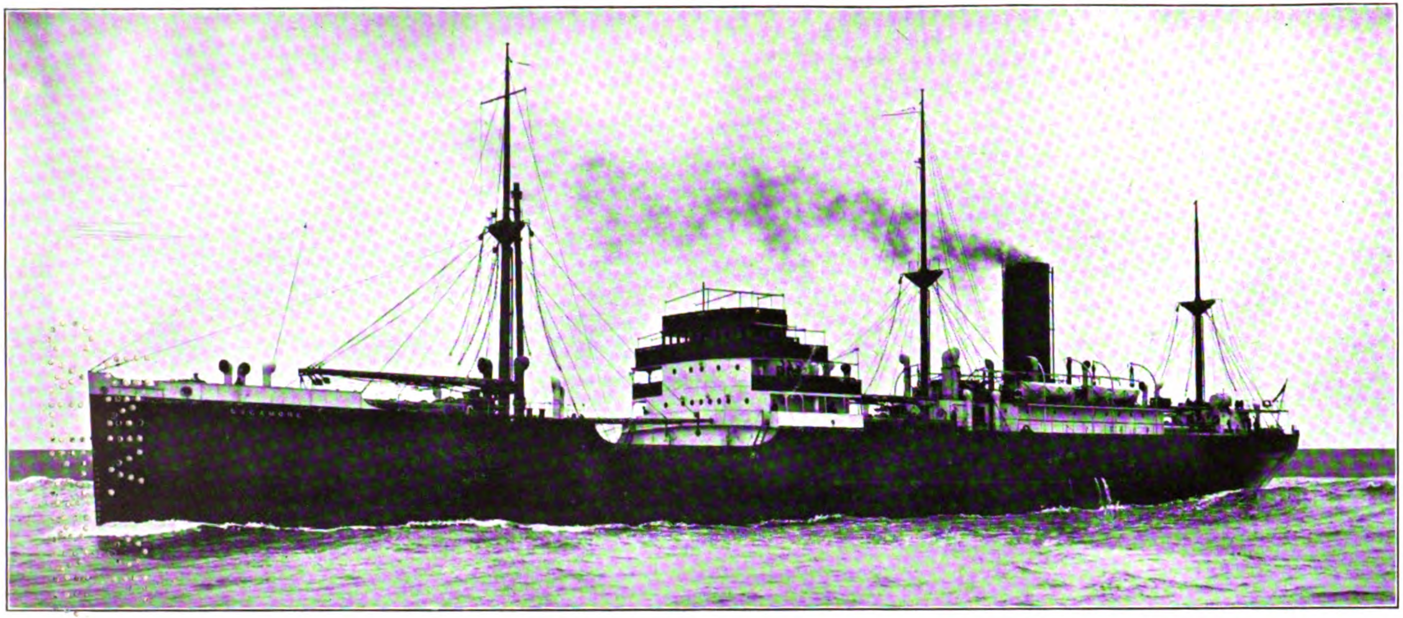
* In 1914 the United Kingdom owned nearly 44½ per cent. of the world's sea-going steel and iron steam tonnage ; the present percentage is just under 33.



(*Photo: W. Haig Parry, Middlesbrough.*)

M.S. SYCAMORE FOR THE JOHNSTON LINE (FURNESS, WITHY & CO., LTD.)

(*Constructed by the Furness Shipbuilding Co., Ltd.*)

The progress of the marine internal-combustion engine as reflected in work in hand in the shipyards, and its relation to the marine steam engine, is indicated in the appended statement :—

| | Steam tonnage. | Motor tonnage. | Percentage of motor to steam tonnage. |
|---|---|---|---|
| December, 1922 | 2,640,572 | 288,057 | 10·9 |
| March, 1923 | 2,511,789 | 327,232 | 12·0 |
| June, 1923 | 2,136,924 | 387,936 | 18·0 |
| September, 1923 | 1,899,436 | 460,868 | 24·0 |
| December, 1923 | 1,793,579 | 634,027 | 35·5 |
| June, 1924 | 1,785,480 | 810,655 | 45·4 |

Of the 810,655 tons of motor shipbuilding in June, 1924, in the shipyards of the world, 355,590 tons was under construction in Great Britain and Ireland, a percentage of 43·8.

The British Mercantile Marine is gaining year by year an increased number of motor ships, as is shown in Table IV, which indicates that Great Britain, the United States, Sweden, Norway, Denmark, and Germany are still adding to their motor fleets.

TABLE IV.—MOTOR-SHIP TONNAGE.

(Excluding vessels with auxiliary motor power.)

| Countries where owned. | | Motor Ships. | | | |
|---|---|---|---|---|---|
| | | 1923. | | 1924. | |
| | | No. | Tons. | No. | Tons. |
| British Empire | Great Britain and Ireland | 139 | 374,873 | 173 | 507,251 |
| | Australia and New Zealand | 8 | 5,581 | 7 | 5,328 |
| | Canada | 19 | 3,130 | 29 | 5,164 |
| | Other Dominions | 17 | 5,373 | 22 | 7,167 |
| America (United States) | Sea | 97 | 139,786 | 119 | 190,658 |
| | Northern Lakes | 5 | 5,200 | 6 | 17,200 |
| | Philippine Islands | 4 | 3,179 | 5 | 1,045 |
| Belgium | | — | — | 2 | 7,568 |
| Brazil | | 2 | 3,852 | 4 | 6,547 |
| Denmark | | 40 | 132,542 | 47 | 167,763 |
| France | | 34 | 27,958 | 27 | 25,892 |
| Germany | | 45 | 84,528 | 61 | 113,555 |
| Greece | | 5 | 1,202 | 3 | 889 |
| Holland | | 52 | 66,577 | 55 | 69,450 |
| Italy | | 34 | 61,374 | 33 | 73,165 |
| Japan | | 20 | 4,375 | 26 | 6,718 |
| Norway | | 130 | 177,071 | 126 | 192,002 |
| Spain | | 8 | 13,378 | 15 | 16,800 |
| Sweden | | 103 | 173,697 | 117 | 195,960 |
| Other Countries or Country not stated | | 62 | 37,455 | 76 | 44,424 |
| Total | | 824 | 1,321,131 | 953 | 1,654,546 |

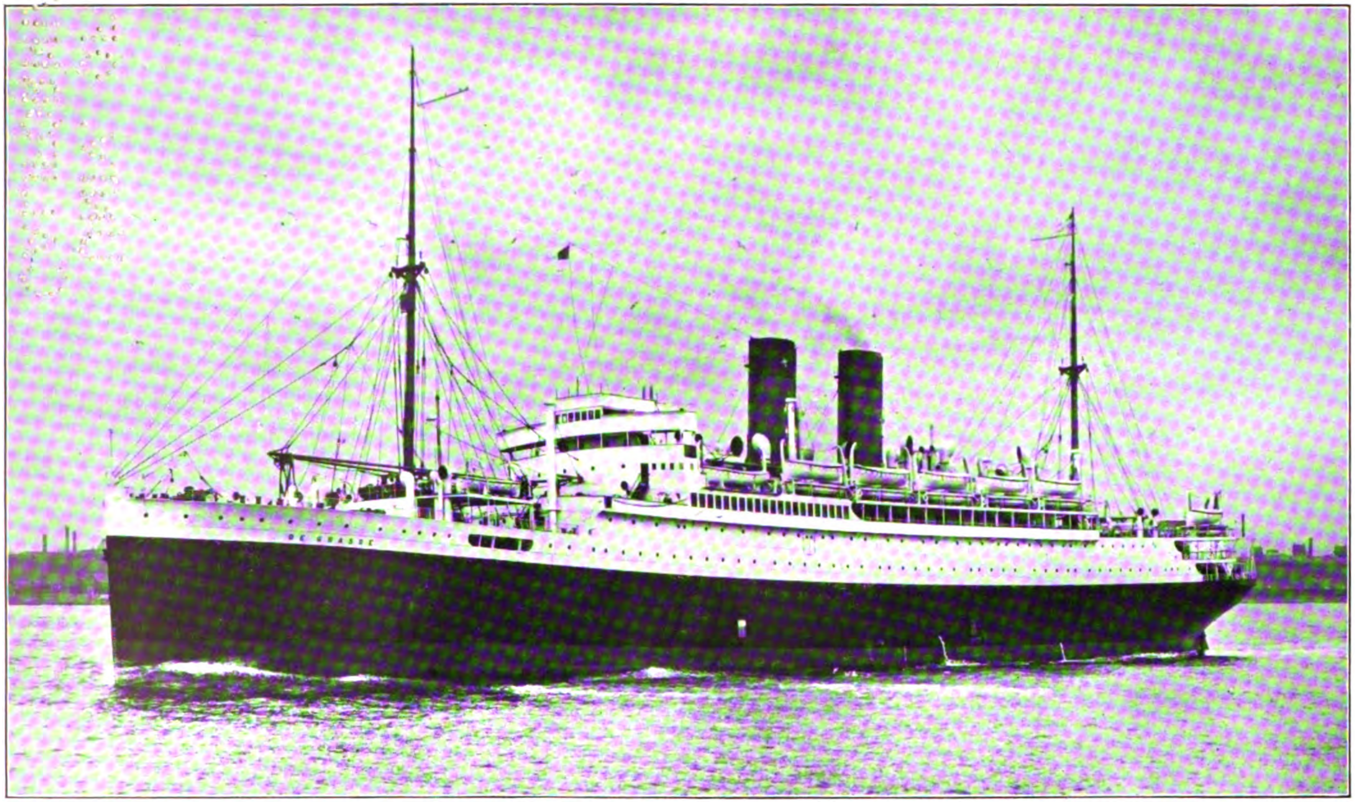
A healthy sign of the economic movement throughout the world is supplied by the figures of idle tonnage, a matter with which Sir Westcott Abell deals exhaustively in his chapter in this edition. The position in British ports was worse on July 1, 1924, than in the first three months of that year—owing to the falling off in the demand on account of the Far East. Compared with the total for April 1, 1924, an increase of 14½ per cent. was shown, but compared with July 1, 1923 (709,102 tons net), a decrease of 34 per cent. was recorded.

Whatever the exact amount of efficient surplus tonnage under all flags—and various estimates have been made—it is apparent that there can be no real revival in the shipping industry so long as there is more tonnage available than there are cargoes to be carried, even though a good deal of that tonnage is obsolescent or obsolete. The movement to break up the obsolete tonnage is already making progress. Whereas in the twelve years preceding the outbreak of war—1902 to 1913—the tonnage of steamers and motor ships totally lost or broken up under all flags averaged 550,685 tons per annum (399,530 tons lost; 151,555 tons broken up) the figures for 1922 and 1923 are as follows:—

| | Lost. | Broken up. | Total. |
|---|---|---|---|
| 1922 . . . | 428,756 | 315,110 | 743,866 |
| 1923 . . . | 494,364 | 957,196 | 1,451,560 |

The tonnage reported broken up during 1924 (January–July), about 650,000 tons gross, shows the same tendency.

The Editors.



(*Photo: Stewart Bale.*)

S.S. DE GRASSE FOR THE COMPAGNIE GÉNÉRALE TRANSATLANTIQUE.

(*Constructed by Messrs. Cammell Laird & Co., Ltd.*)

# CHAPTER IV.

## BRITISH SEAMEN'S WAGES.

IN May, 1924, the National Sailors' and Firemen's Union presented to the shipping employers of this country a formal proposal that the basic standard rate of wages (*i.e.* the wage of the able seaman) should be increased forthwith by £1 per month. This motion—it would be incongruous with the excellent relations subsisting between capital and labour in the shipping industry to term it a " demand " —was duly considered by the industry's joint council, the National Maritime Board, and an agreement concluded that the increase asked for should be granted, but spread over three months in two equal instalments effective from June 5 and September 5 respectively.

The decision to raise the basic wage—involving proportionate increases for the higher grades of ships' personnel—although voted unanimously by the shipowners' representatives on the National Maritime Board, was not received with particular enthusiasm by the general body of shipping employers, and was unfavourably critizised by that section of the shipping press which reflects especially the views of cargo-tonnage interests. Reduced to essentials, the criticism was based on a twofold objection: (*a*) that wages were already high enough to satisfy reasonable living standards; (*b*) that shipping was not in a position to bear any addition to wage-costs. The opinion was expressed by several shipowners, and was no doubt widely shared, that but for the impetus given by what they regard as the ill-advised increase granted to dockers earlier in the year, no move would have been made by the Seamen's Union to raise standard rates afloat. Apprehension was felt that this might be only the beginning of a succession of additions to the labour charges on shipping, and that the industry was faced with the danger of a domestic and disastrous " inflation " before it had fairly emerged from the great depression of the past three years.

## THE ATTITUDE OF THE SEAMEN'S UNION.

Appraisement of the policy of the National Maritime Board in raising seamen's wages would be anomalous on the part of the writer, whose purpose is necessarily limited to a purely objective record. Certain obvious questions, however, arise and require some explanation. Those who are aware of the consistent readiness which the Executive Council of the Seamen's Union has displayed for many years to appreciate and meet the employers' difficulties and points of view, will be constrained to ask why the seamen's leaders on the present occasion were not convinced by any objections raised against their proposal and insisted on pressing their motion to a decision in their favour. If this be explained, the reason for the Board's criticized determination will be at least so much the clearer.

Attempts by a third party, acting as *amicus curiæ*, to present the dominant motive of either of two contestants in an issue are liable to error, but it may be asserted with some confidence that in their move for increased wages, the seamen's representatives were actuated chiefly by dissatisfaction with the effect of the previous reduction in wages, from £10 to £9 per month, in April, 1923.

Other considerations, it is true, were present: substantial reduction in the amount of idle tonnage and numbers of qualified seamen unemployed; some revival during the winter in "tramp" freights, coupled with slightly more encouraging accounts of "liner" business; signs of increased shipbuilding activity, and prospects of a good passenger season. All in all, the seafarers' representatives felt that an improvement in shipping conditions, if not fully materialized, was at least incipient. If, in addition, their constituents were not slow to point to the dockers' increase and contrast the apparent inactivity of one Union unfavourably with the forward policy of the other, can the greatest pessimist doubt that in the position of a member of the Seamen's Executive he himself would have been tempted to view the economic position optimistically?

## The Cost of Living.

Apart, however, from these secondary, though not negligible considerations, there remained the dominant factor already referred to—dissatisfaction with the purchasing power of the £9 wage; and however much the economic theorist may discredit the "cost of living basis" as a method of fixing wages, and the industrialist protest that the product of industry must determine the remuneration of labour, the fundamental fact remains that men strike less because their employers are relatively too rich than because they, the workers, feel themselves absolutely too poor.

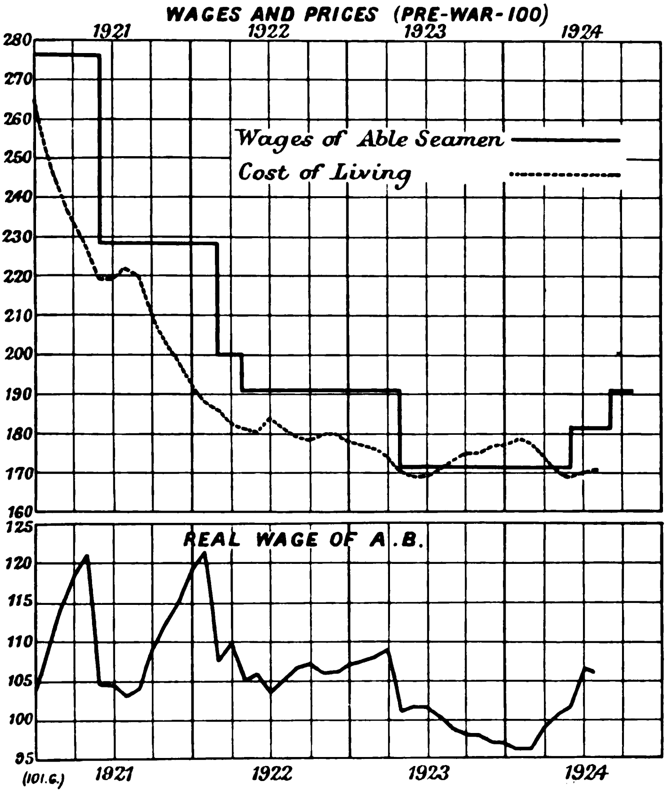
In the table and accompanying diagram on the opposite page, the course of seamen's wages and of retail prices, as measured by the official index figure of the cost of living, may be traced from the beginning of 1921 to the present date.

It will be seen that, with respect to retail prices, the period divides itself into two distinct phases, that of deflation and that of stability—subject, naturally, to seasonal fluctuation. The first phase, initiated two months prior to January, 1921, lasted until

WAGES AND PRICES, 1921–24.

| Date. | Standard wage A.B. | | | *Wage index average, 1914 = 100. | Cost of living index, 1914 = 100. | † "Real wage" index, 1914 = 100. |
|---|---|---|---|---|---|---|
| | £ | s. | d. | | | |
| 1921, January 1 . . . | 14 | 10 | 0 | 276 | 265 | 104 |
| ,, May 1 . . . . | 14 | 10 | 0 | 276 | 228 | 121 |
| ,, June 1 . . . | 12 | 0 | 0 | 228 | 219 | 104 |
| 1922, February 1. . . | 12 | 0 | 0 | 228 | 188 | 121 |
| ,, May 1 . . . . | 10 | 0 | 0 | 190 | 181 | 105 |
| 1923, April 1 . . . . | 10 | 0 | 0 | 190 | 174 | 109 |
| ,, May 1 . . . . | 9 | 0 | 0 | 171 | 170 | 101 |
| 1924, March 1 . . . | 9 | 0 | 0 | 171 | 178 | 96 |
| ,, July 1 . . . . | 9 | 10 | 0 | 181 | 170 | 106·5 |
| ,, August 1 . . . | 9 | 10 | 0 | 181 | 171 | 106 |
| ,, October 1 . . . | 10 | 0 | 0 | 190 | — | — |

* The average 1914 wage is assumed to be £5 5s. per month.
† "Real wage" index = wage index ÷ cost of living index.



about October, 1922, and lowered the price index from 276 to 178. During the second phase, which still continues, the range of the cost of living figure has been between 180 and 169, a tendency to fall during the spring being counter-balanced by an upward trend in the autumn.

In 1921–22 the movement of wages, it will be observed, was symmetrical with the deflation of prices, successive reductions (with a normal time-lag whose effect, through the steepness of the price-fall, is reflected markedly on the " real wage " curve) restoring the " balance " of the real wage index on each occasion to somewhere about 105, *i.e.* keeping the seaman 5 per cent. better off than his admittedly somewhat low pre-war standard.

The final wage-reduction in April, 1923, prompted on the employers' part by the same need for cheaper costs to meet low freights as had been the motive for their previous calls for lower wages, had for the seamen results essentially different from the earlier reductions and perhaps not adequately anticipated by the representatives of either side. The downward trend of prices in the first half of 1923 was not a renewal of the deflationary phase, but only a seasonal fluctuation. Thus the index of " real wages " which the April, 1923, reduction left at 101, instead of recovering as before, fell still further and from August, 1923, to May, 1924, was actually below 100.

### The Value of the Wage.

Therein lies the motive, whether economically sound or not, for the insistence of the Seamen's Union in May, 1924, " that wages should be restored to their 1922 level." The effect of the first instalment of that restoration, coupled with the favourable seasonal movement of prices, has been to raise the " real wage " index once more to the neighbourhood of 105, the figure of apparent " post-war equipoise." The second instalment is not likely to do much more than offset an almost certain autumnal rise in prices, maintaining the " real wage " figure round 105 till the spring of 1925, whose shipping history has still to be written.

Unfortunately the incidence of a fresh Reparations Crisis, accompanied by chaotic movements of European valuta, accentuated the usual summer slackness of trade for " tramp " shipping in 1924, and rendered payment of increased wage bills less palatable to owners than might have been hoped. At the same time, the full weight of the increase on running costs (amounting to, say, £50 per month on a fairly large cargo steamer) did not accrue until the normal autumnal improvement in freights was due. As a result, perhaps, of some alleviation in bunker-coal costs, no serious addition to laid-up tonnage can be ascribed to the first instalment of the wage-increase, and the shipping industry is fortunate in that the seamen's representatives, who are well apprised of economic considerations, are unlikely to press for any premature " inflation " of working costs. The price which, from the employers' point of view, it is worth while to pay to maintain the good-will and co-operation of employees must always be a matter of opinion. The writer has been concerned simply to indicate what price had this year to be paid by shipowners, and to suggest why, on the part of that admirable and by no means intransigent person—the British seaman—a certain price was asked.

AYLMER VALLANCE.

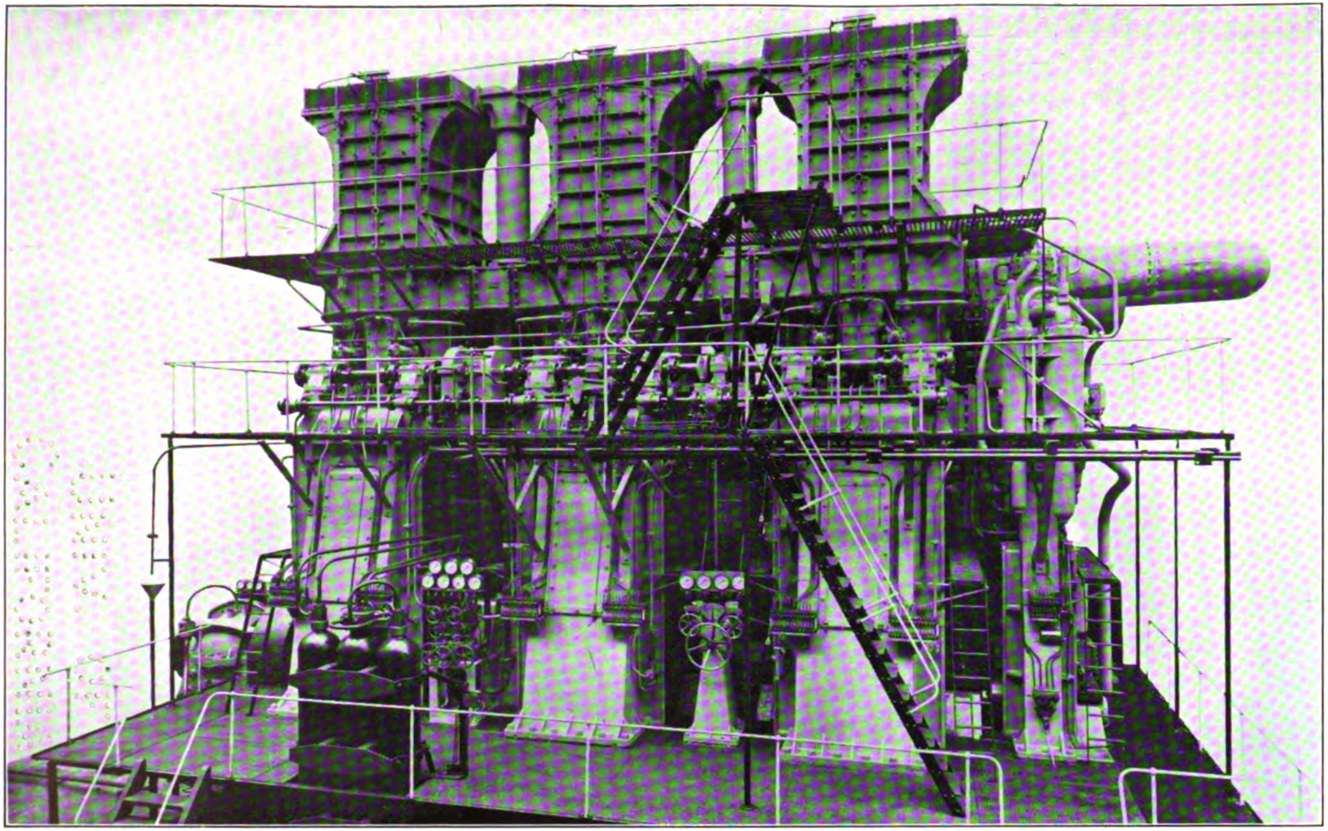
# CHAPTER V.

## MARINE MACHINERY IN 1924.

To abler pens must be left the task of any dissertation on the subject of the deep and continuing depression in the marine engineering and shipbuilding industries. The period of drawing upon reserves to enable shipbuilding and marine engineering contracts to be undertaken and completed at costs agreeable to the buyer must come to an end, and be followed in sequence by the phase when work only pays its bare way before gradually the time arrives when a definite, although small, profit on work done is earned. The present outlook is further clouded by the future uncertainty of the gradual and growing strength of foreign competition alike in shipbuilding and marine engineering; when dealing with the marine internal-combustion engine, further reference, in some detail, will be made to this subject. In spite of the general trend of affairs, as indicated in these great—and where Great Britain is concerned certainly they can be described as—key industries, some philosophic comfort can be gained by the reflection that in the technique of shipbuilding and marine engineering, no abatement of effort nor of striving towards the ever evasive ideal is to be noticed. In fact, as has been pointed out, to a very large extent the obsolescence of tonnage can be hastened by the increased operating efficiency resulting from the installation of modern equipment in a ship. Such a demand for new tonnage, hastened and intensified, is responsible for the keenness of the technical race so engendered and tends towards yet further financial burdens on the industry in the effort necessary to provide the means for constant development, research, experiment, and the rectification of errors due to over stressing ambitious schemes.

### STEAM EFFICIENCIES.

So much of the available marine engineering brain-power is to-day concentrated on the problems of internal combustion that the standard steam marine propelling plant is somewhat neglected. The scarcity and smallness of naval programmes has intensified this effect, but with some new warship construction now going forward, the technical development of marine steam plant will unquestionably benefit. On shore, electric power stations, where the size of units steadily increases naturally in order to achieve the maximum generating efficiency, internal combustion is not generally applicable, but gradual progress is being made with steam units. The present



3000 B.H.P. PALMER-CAMELLAIRD-FULLAGAR OIL ENGINE FOR THE OIL TANKER BRITISH AVIATOR.

*(Constructed by Messrs. Palmers Shipbuilding and Iron Co., Ltd.)*

development, strongly marked, is towards a higher temperature and pressure range from the boiler to the condenser. There is no opportunity for extension of this range at the condenser end, so boiler pressures and steam temperatures, especially the former, are being rapidly advanced. A working pressure of 475 lbs. per square inch is in use in England.* Boilers for high pressures are being constructed abroad, and experiments at home and the world over aim at the very high figures of 1,000 lbs. per square inch and over. Water-tube boilers are standardized. For general mercantile marine work, for excellent reasons which do not require reiteration, the water-tube boiler makes no headway. A combination, however, of a cylindrical Scotch boiler with water tubes and steam and water drums forming the combustion chambers has been developed in France by the Chantiers Navals et Chaudronneries du Midi, Marseilles. Several ships provided with these boilers are at sea, and, so far as is known, they are performing satisfactorily. At home, Messrs. Howdens, of Glasgow, are developing a steam generator capable of carrying high pressures. At present, pressures up to 350 or even 400 lbs. per square inch are being experimented with. This is definitely 150 lbs. per square inch higher than has been previously attempted at sea. It is too early yet to give any definite details. The first Howden boiler has five furnaces, and is equally suitable for oil or coal firing. There are no return tubes or integral combustion chambers—but a combustion chamber is formed between the back end of the boiler and a water-tube element having straight tubes.

## HIGHER-PRESSURE BOILERS.

In itself, the increase of a working pressure of 150 lbs. per square inch above the highest to-day, whilst making for a small increase of economy, is by no means the only, if indeed the principal, claim. The construction and maintenance of the boiler should not be more costly than that of the ordinary marine type, but it lends itself, as may be gathered from the very brief particulars given, very aptly to the fitting not only of mechanical stoking arrangements, but also to the installation of mechanism for the removal of the ashes. If, therefore, in this way means can be devised mechanically to handle the coal from the bunkers to the hoppers of the stokers and to remove the ashes, steam generating plant on board ship would be in line with thoroughly established standard practice on land, and some of the most important advantages of oil—as compared with coal—firing in steamships would disappear. Repeatedly in the past efforts have been made to improve the mechanical efficiency of the fuel handling in ships. Water-tube boilers have been generally used, but so strong are the objections to ordinary forms of this type for merchant ships that little success has been achieved. This new boiler presents a promising line of development. However optimistically or pessimistically the predictions of the geological experts may be regarded, it seems certain that there is much more coal in the world than oil, and that the supply of the solid fuel will outlast the liquid fuel. Coal as a means for supplying power even afloat cannot be neglected, and because of the very great importance of this subject as full as possible reference is made to these developments, although the time is not yet ripe to give definite details.

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* A boiler at Rugby has worked experimentally at 3,200 lbs. per sq. in.

The Howden-Ljungström air preheater described in the last edition of the "Annual" is finding an increasing application on shore and at sea. One Swedish ship, the s.s. Hugin, of 1,190 tons gross with triple-expansion steam engines of 965 I.H.P. and superheat, and fitted with these preheaters, burns 12·4 tons of coal per day or 1·2 lb. per I.H.P. hour.

The Alfred Holt Co., notably in the forefront of progressive shipowners in giving a fair trial under working conditions to many novelties promising a decrease in working costs, will have at sea, towards the end of the year 1924, a steamer so fitted. With this company assurance may be felt that high grade plant will receive ample supervision, and that the results in service will be carefully collected and co-related. In consequence the operation of these preheaters will be closely watched.

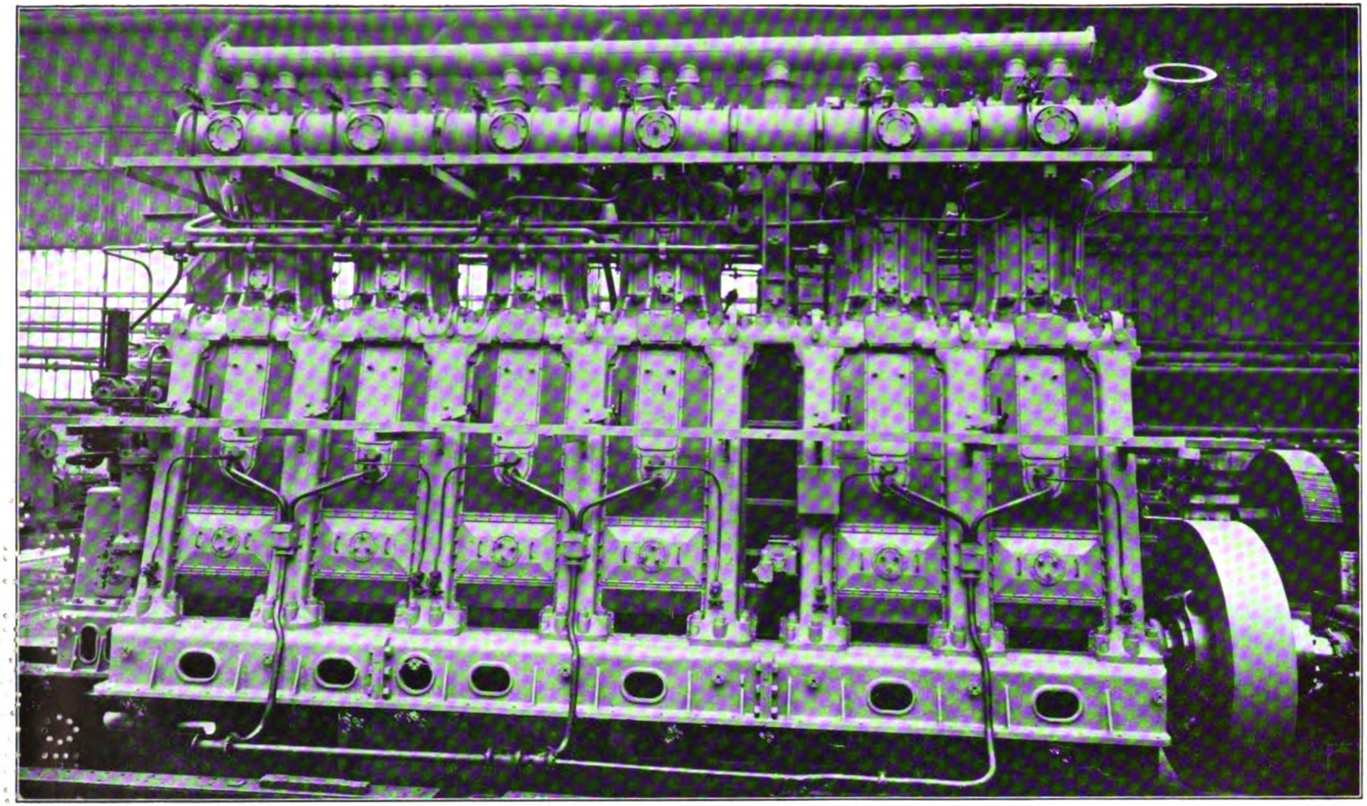
## Mechanical Reduction Gearing.

Mechanical gearing, a subject which less than two years ago was unique in the marine world in respect of its potentialities for raising severe controversy, to-day provokes little interest. A certain tendency for reversion towards single reduction in the case of the relatively few turbine ships under construction is to be noted. This can only be a passing phase. If the dictates of economy demand such a ratio of speeds of revolution of the turbine and the propeller that only double-reduction gear will satisfy the limitations of space available, then there remains no reason whatsoever on the score of reliability why double-reduction gear should not be installed. In the case of the two magnificent Italian passenger double-reduction, geared-turbine liners, the Conte Rosso and Conte Verde, it is satisfactory to note that, in spite of intensive service in the North Atlantic, a slightly larger ship for the same owners and service is now under construction, and will be engined with exactly similar double-reduction turbine plant.

For the manufacture of the gearing many grades of thoroughly reliable steel are available, the tendency, however, is to utilize rather softer steel than was advocated earlier, in order to facilitate the spreading over as large an area as possible any load unequally applied due to distortion, deformation, or slight inaccuracies in manufacture.

## The Motor Ship.

During the last twelve months, the motor ship has very greatly advanced in general favour with shipowners. The latest figures available, at the date of the issue of the "Annual," show that in ships each of less than 1,000 tons gross about 600,000 B.H.P. is afloat. For ships each of over 1,000 tons gross building at the same date, 429,000 B.H.P. of internal-combustion machinery was



1750 I.H.P. BEARDMORE-TOSI DIESEL ENGINE FOR THE M.S. SILURIAN.

*(Constructed by Messrs. Wm. Beardmore & Co., Ltd.)*

under construction. Lloyd's Returns show that the motor tonnage under construction to-day the world over is over one-third of the total. In certain countries, notably Germany, Sweden and Denmark, there is much more motor than steam tonnage building. It will not be disputed that but for the savings accruing from the installation of this latest and most economical prime mover, a great amount of the tonnage now under construction to be equipped with motors would not have been ordered at all. Shipowners would have been content to carry on with the standard type of steamship, bought at cheap prices. In this way the whole industry owes a deep debt of gratitude to the pioneers in this development, and the foregoing facts, which it would seem impossible to refute, make it all the more difficult to comprehend the extreme conservatism, even scepticism, far too frequently met with even to-day.

Table I. indicates the position and shows the very satisfactory place taken by Great Britain.

Table I.—Oil Engine B.H.P. afloat for Ships over 1,000 Tons (Gross).

| Country. | B.H.P. 4-cycle. | B.H.P. 2-cycle. | Total B.H.P. |
|---|---|---|---|
| Great Britain | 138,600 | 23,700 | 162,300 |
| U.S.A. | 47,400 | 27,300 | 74,700 |
| Norway | 62,400 | 6,700 | 69,100 |
| Sweden | 56,800 | 11,200 | 68,000 |
| Denmark | 61,200 | — | 61,200 |
| Germany | 31,400 | 12,100 | 43,500 |
| Italy | 24,600 | 9,600 | 34,200 |
| Holland | 23,800 | 4,200 | 28,000 |
| France | 1,600 | 7,600 | 9,200 |
| Spain | 1,700 | 5,900 | 7,600 |
| Japan | 1,200 | 1,500 | 2,700 |
| South American States | 1,800 | 6,400 | 8,200 |
| Finland | 200 | 300 | 500 |
| Other Countries | 200 | 3,500 | 3,700 |
| Total oil engines B.H.P. afloat over 1,000 tons | 452,900 | 120,000 | 572,900 |

## Reliability of Internal-Combustion Engines.

The advance of the motor ship has been slow, even when allowance has been made for all the conditions arising out of the war and our abundance of cheap coal. For its inception and proof of sea-worthiness the Diesel engine is indebted to a few shipowners who, it must be stated, were so related to progressive marine engineers that the gradual building up by them of a fleet of motor ships did not compel attention, and was not regarded generally as forming any substantial proof of superior operating efficiency. That time has passed. To quote the words of one of our leading authorities, Sir Frederick Lewis, Chairman of Furness Withy & Co., Ltd., "There is no doubt that from the point of view of operation, the Diesel engine has already established itself; that is to say, the consumption of fuel is less, the number of men required in the engine-room is less, and the space occupied in the ships is less than in the case of a steam engine, and the motor engine gives a very consistent performance at sea." In the same speech the motor ships named are the Doxford 2-stroke-cycle engined ships—the M.S.S. Pacific Shipper and Pacific Trader, and the M.S.S. Sycamore and Tramore, engined with 4-cycle Beardmore-Tosi motors by Messrs. Richardsons, Westgarth & Co., Ltd.

So far as reliability is concerned, Diesel-engine propelling plant has now been definitely proved to be entirely satisfactory, so that for the excellent reason of lower first and operating costs, such as engineers' wages, etc., the single screw ship is generally being preferred for cargo carrying. Simultaneously higher powers are being demanded for the larger cargo carrying motor ships, still on a single shaft. These demands can now very readily be met.

## THE MOTOR LINER.

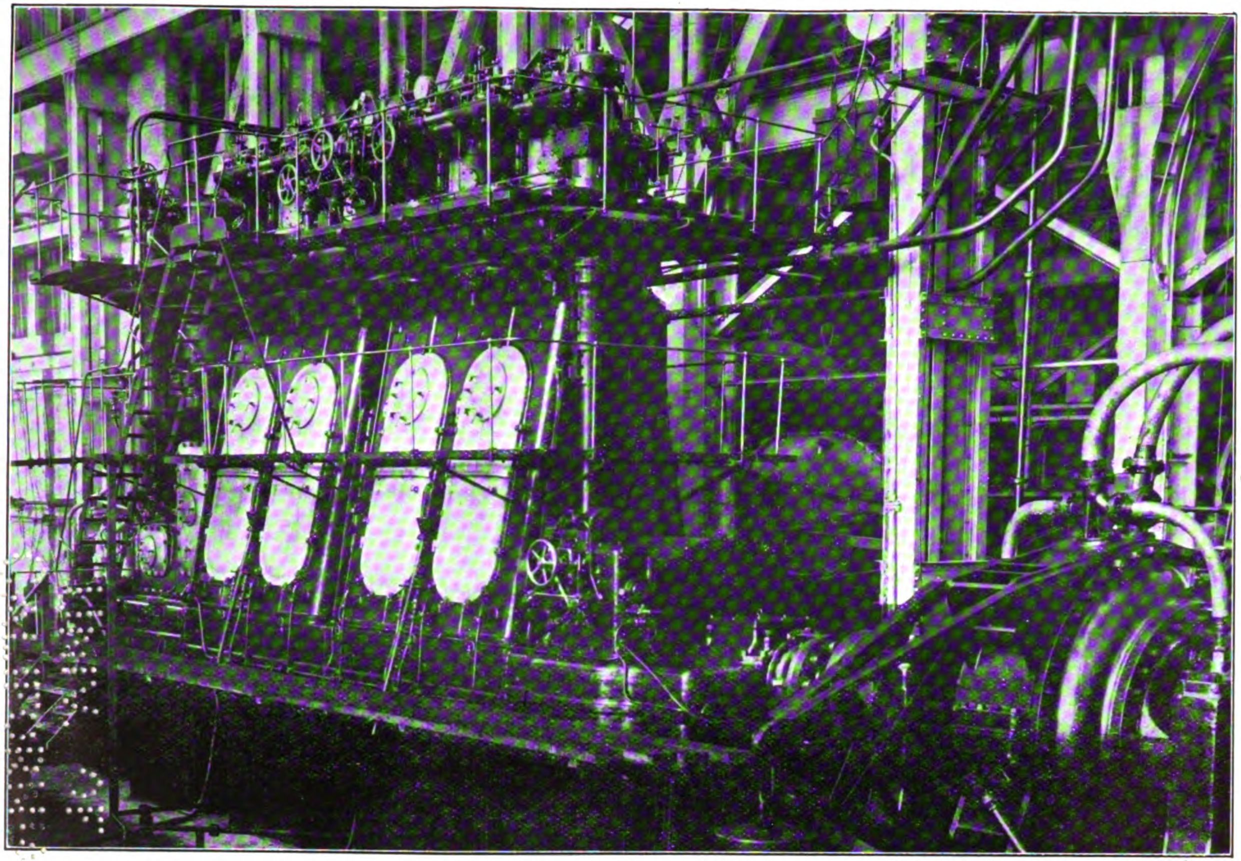
The large passenger motor liner entered the field in 1923, and has leapt into prominence this year by virtue of the large number now under construction; to be engined with 6 or 8 cylinder engines on twin or quadruple screw shafts developing, in the case of the largest now building, a total of 18,000 brake horse-power per ship on twin screws.

It has long been emphasized in the technical press, papers and and discussions before learned societies, as a fundamental truth, that the stress in the walls of large internal combustion cylinders, due to the great temperatures and high pressures, increase rapidly and disproportionately with augmented powers. Often these considerations were regarded as sufficient deterrent to prohibit enough power being developed in a reasonable number of cylinders to make the Diesel engine a competitor with the steam turbine in this field.

The difficulties were perhaps overstated. Experiments have shown that, with careful design and accumulated experience, particularly in the direction of intensive cooling, utilizing at the same time the more reliable materials now available from our foundries, the stresses in large units of even more than 1,000 B.H.P. per cylinder are no insuperable barrier. The incentive towards the production of these large machines is present, since oil fuel is a necessity for passenger carrying ships, and the running costs attributable to the machinery with these large motor liners, including fuel, wages, and lubricating oil, should not be one half of that of a steamer. A large margin is therefore available should it be found, at the worst and in the initial stages of the development of these great machines, that the extra handling of the necessarily heavy masses of the working parts for overhaul and general maintenance is a debit.

## DOUBLE-ACTING ENGINES.

These engines are mostly of the double-acting type. There is no novelty in the idea of double action with internal-combustion engines. The gains which must accrue as a result of developing



1350 B.H.P. FOUR-CYLINDER, TWO-CYCLE DIESEL ENGINE FOR M.S. BELDIS.

*(Constructed by Messrs. Sir W. G. Armstrong, Whitworth & Co., Ltd.)*

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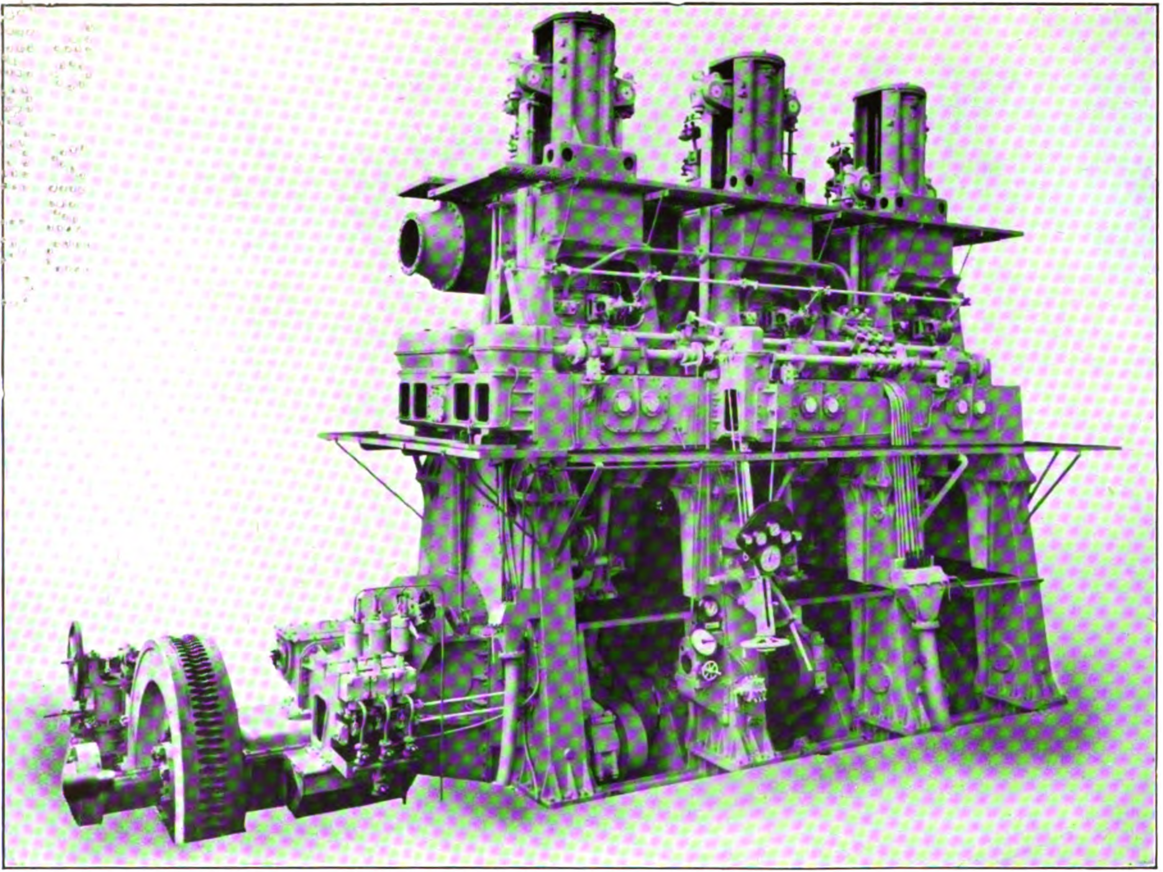


THREE-CYLINDER DOXFORD MARINE DIESEL ENGINE FOR M.S. PACIFIC SHIPPER.

*(Constructed by Messrs. William Doxford & Sons, Ltd.)*

power on both sides of the working piston are obvious. The engine is lighter, although higher, for a given power. There is a gain in efficiency, since for a given power lesser weights have to be reciprocated and smaller surfaces are in frictional contact. The double-acting four-stroke-cycle gas engine is a proved success. Continental constructors with years of experience in this field, who spoke at the recent International World Power Conference at Wembley, were impressive in their testimony to this type of prime mover. It is not meant to be inferred that because the double-acting, two-stroke-cycle gas engine was a comparative failure, that such a system with the Diesel principle cannot be favourably regarded. With the oil engine the fuel is not introduced into the cylinder until the time of combustion, so eliminating the chief cause of inefficiency, *i.e.* loss of charge and pre-ignition with double-acting, two-cycle gas engines.

Whilst the gains with double action are very obvious the disadvantages are not so apparent. It must not be assumed, as is done, that since the conversion of a steam engine from the single to the double-acting principle is relatively a simple change, that internal combustion presents any parallel. With the oil engine the piston ring, the liner, and the piston are the most important parts. With the single-acting engine these can readily be inspected during running, and their condition fairly accurately estimated. Full examination, replacements or repair are very quickly and conveniently carried out. With the double-acting engine the condition of these parts is not so easily gauged, and their examination and replacement call for much greater work. The stuffing box for the piston rod is an addition and a complication when dealing with high-temperature gases, but it need not cause concern, although it will definitely require a certain amount of maintenance.

In other words, the successful evolution of double-acting engines will not cause the complete supersession of the single-acting type, which, with its admirable simplicity and accessibility, will compete for some very considerable time up to certain powers. It is difficult to estimate exactly where the line of demarcation will lie, probably between 2,500 and 3,500 B.H.P. per engine. To many, the reasons for the very large amount of double-acting, four-stroke-cycle Diesel construction going forward to-day is somewhat obscure. The aim of most marine engineers with steam training is to produce an oil engine comparable in simplicity with the standard triple expansion steam unit.

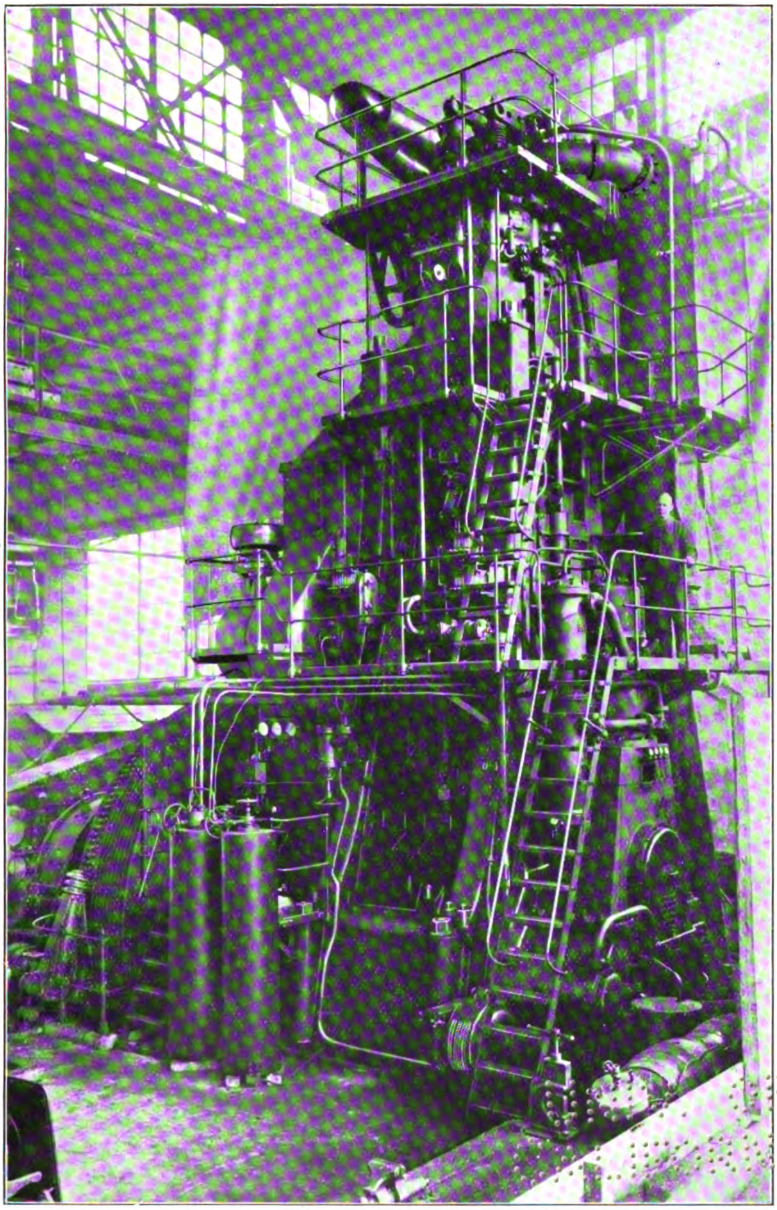
## Two-Cycle, Double-Acting Engines.

Undoubtedly the two-stroke-cycle, double-acting engine, in the evenness of its turning moment, in its exterior simplicity, the fewness and smallness of the valves controlling the admission of fuel and starting air to the cylinders, and the possibility of developing power with few cylinders and cranks, make it a very attractive solution to the marine internal-combustion engine problem. On the other hand, the problems associated with scavenging and exhaust are intensely difficult, particularly when a piston rod of fairly large diameter and internally cooled must pass through the bottom combustion chamber. The advantage of the simplicity of the exterior is counterbalanced by the complications of the internal castings. The supply of the necessary quantity of scavenging air calls for large and expensive plant. The double-acting two-stroke cycle engine has one advantage over the single-acting two-cycle engine, in that the lubrication of all the main bearings is facilitated by the release of pressure which is always in the one direction with the single-acting two-cycle engine.

In connection with the internal castings, the complications arise from the fact that in order to ensure satisfactory life, protection against heat has to be provided for by way of the introduction of water passages, etc., for intensive cooling. It is as yet, of course, quite uncertain what mean effective pressure a two-stroke-cycle double-acting marine engine will be able to sustain in the working cylinders continuously under working conditions, but all the evidence so far points to this figure being a relatively low one. In such case, there is little doubt that a double-acting four-stroke-cycle engine which has reached relatively high mean effective pressures even without supercharging, will, if supercharging be employed, remain in a strong position. Obviously, if the cast iron or the materials used for the cylinder liners and cylinder covers of the two-stroke-cycle double-acting engine can withstand heat stresses of any given order, there is no reason whatever why equal stress should not be imposed on the equivalent parts of the double-acting four-stroke-cycle engine, by using supercharging, so enabling approximately the same quantity of fuel to be consumed and approximately the same amount of power to be continuously developed as with the two-cycle double-acting engine. The four-stroke engine has, and always will have, the one outstanding fundamental advantage in that the introduction of the air supporting combustion and the expulsion of the products of combustion are controlled by the piston, the liner retaining its simple tube form without the complications of ports, etc. It is not, therefore, at all probable that the two-stroke-cycle double-acting engine, while it may be favoured in many quarters, will usurp the field.

## GERMAN ENGINES.

When dealing with two-cycle double-acting engines, we must look to Germany for most of the experimental results that have been obtained to date. Table II., on p. 223, gives the chief data of the principal double-acting marine oil engines which have been built. Developments in Germany before the war, took the form of building large double-acting four-stroke-cycle Diesel engines of the horizontal type for land duties very similar to the large gas engines then standardized. Some success was achieved. Simultaneously experimental construction of marine double-acting two-cycle Diesel engines was pursued on a large scale. Mishaps of a serious nature cut short these endeavours, but the same determination and perseverance has marked post-war developments, and a number of



SINGLE-CYLINDER, DOUBLE-ACTING, FOUR-CYCLE EXPERIMENTAL DIESEL ENGINE.

*Constructed by Messrs. Burmeister and Wain.)*

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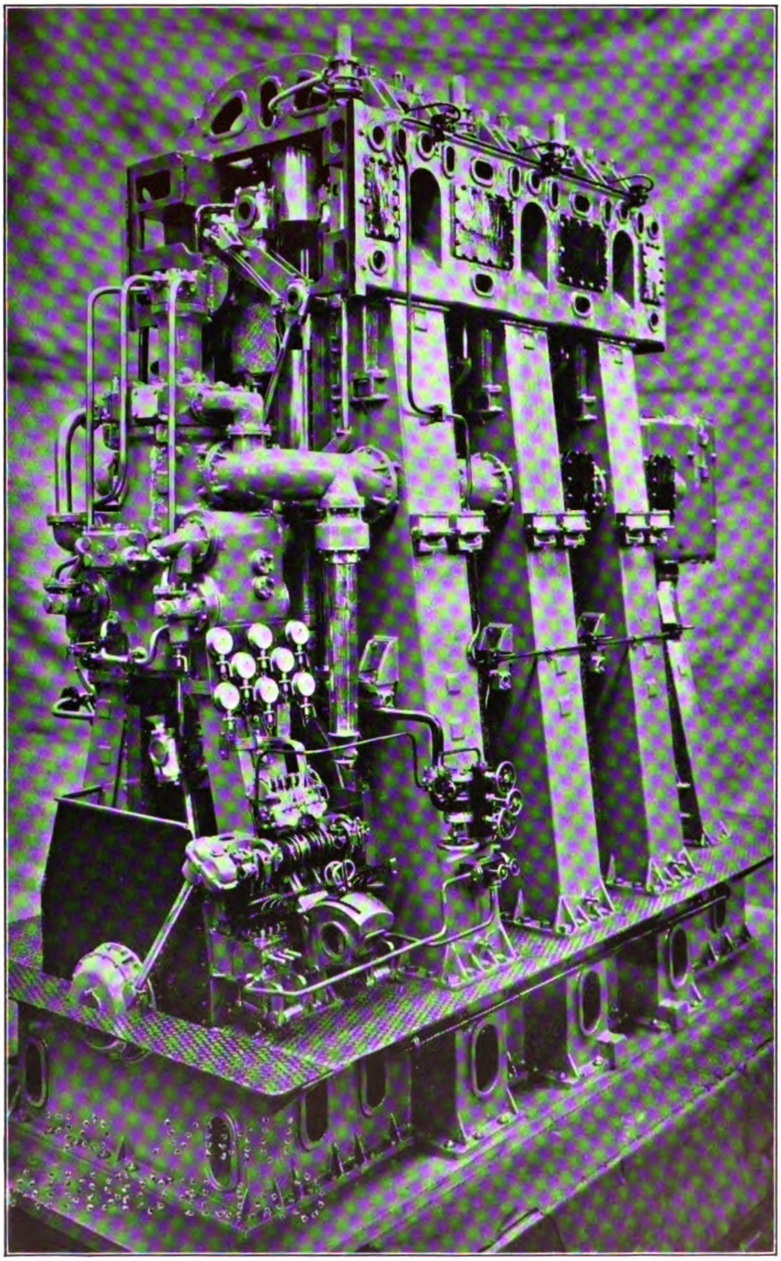

2000 B.H.P. TWO-CYCLE, THREE-CYLINDER, DOUBLE-ACTING DIESEL ENGINE FOR M.S. SWANLEY.

(*Constructed by the North-British Diesel Engine Works, Ltd.*)

experimental double-acting two-cycle Diesel engines are running and are being built in Germany at the present time.

A number of different designs of engines are being tried out, covering varied means of scavenging and methods of fuel injection into the cylinders, and some very large claims are being made by way of enormous outputs from cylinders. These are test-bed results and are reminiscent of the claims put forward in 1912 and 1913. If one thing is certain in the realms of internal combustion, it is that it is not very difficult to obtain very high mean effective pressures on the test bed, but it is a matter of an entirely different order to sustain these outputs in service continuously at sea. In due course German double-acting two-cycle engines, possibly ordered by British shipowners, will be at sea, and the results then achieved will definitely place this prime mover in its correct position in regard to the older and better established power units.

TABLE II.—PRINCIPAL DOUBLE-ACTING MARINE OIL ENGINES.

| Maker of engines. | Ship. | Type of engine. | No. of engines. | Total B.H.P. | I.H.P. per engine. | No. of cyls. per engine. | B.H.P. per cylinder. | Dia. of cyl. in inches. | Stroke of cyl. in ins. | R.P.M. |
|---|---|---|---|---|---|---|---|---|---|---|
| Blohm & Voss (M.A.N.) | M.S. Fritz | 2-cycle | 2 | 1,700 | 1,250 | 3 | 283 | 18⅞ | 28 | 110 |
| Werkspoor . . . . | Experimental | 4-cycle | 1 | — | — | 1 | — | 17¾ | 26¾ | — |
| M.A.N. (Nürnberg) . | Experimental | 2-cycle | 1 | 12,000 | 16,000 | 6 | 2,000 | 33⅜ | 41¼ | 160 |
| M.A.N. (Augsberg) . | Experimental | 2-cycle | 1 | 1,600 | 2,000 | 2 | 800 | 25½ | 41¼ | 100 |
| Scott's S. & E. Co. (Scott-Still) . . . | M.S. Dolius | 2-cycle | 2 | 2,500 | 1,500 | 4 | 312 | 22 | 36 | 120 |
| N.B. Diesel Engine Works . . . . | M.S. Swanley | 2-cycle | 1 | 2,000 | 2,750 | 3 | 667 | 24½ | 44 | 100 |
| Burmeister & Wain, Copenhagen . . . | Experimental | 4-cycle | 1 | 1,125 | 1,460 | 1 | 1,125 | 33 | 55⅛ | 125 |
| Burmeister & Wain, Copenhagen . . . | M.S.Gripsholm | 4-cycle | 2 | 13,500 | 8,660 | 6 | 1,125 | 33 | 59 | 125 |
| Harland & Wolff (B. & W. System) . . . | Union Castle | 4-cycle | 2 | 18,000 | 10,000 | 8 | 1,125 | 33 | 59 | 125 |
| North Eastern Marine (Werkspoor) . . . | Experimental | 4-cycle | 1 | 600 | 750 | 1 | 600 | 31½ | 55 | 95 |

There seems to be a certain amount of collaboration between the German constructors in this work, on which sound policy their engineers are to be congratulated, as making for the economical and early achievement of successful results, which results will tend to increase competition for the supply of marine oil engines to shipowners the world over.

## FOUR-CYCLE, DOUBLE-ACTING ENGINES.

The leading particulars are given in Table II. above, of the four-stroke-cycle, double-acting engines, and the number of large ships now under construction, some of which are nearing completion, of from ten to twenty thousand tons deadweight to be engined with these prime movers is not less than sixteen, with twenty-four main engines, totalling some 130,000 brake horse-power. These are principally Burmeister and Wain and Werkspoor engines based on the results obtained from experimental single cylinder units illustrated on the Plate facing page 222.

The arrangements with the Burmeister and Wain engine of the top cylinder cover are normal, at the side of the bottom cover is a pocket containing the usual inlet, exhaust, and fuel valves. The compression in the lower combustion space is high, and to shield the piston rod from the effects of the combustion temperature it is shrouded by a cast-iron sleeve internally cooled. For dismantling the piston, the top cylinder cover must be lifted off and the piston withdrawn upwards in the usual way. The engine is rated at a high mean output, involving large mean pressures both in the top and bottom of the cylinder and a high piston speed.

The other four-cycle, double-acting engine shown on the Plate facing this page, developed by the Werkspoor Company of Amsterdam and their licensees in this country, the North-Eastern Marine Engineering Company, is equally interesting, and is being built now for installation in seven ships.

Combustion on the lower side of the piston is at low compression pressure, so that the pocket containing the valves into which the fuel is sprayed is large and permits thus of being bolted on to the side of the bottom cylinder cover. In this case the piston rod is not shrouded. The top cover and liner are in one piece and the arrangements for the examination of the piston are ingenious and interesting. The bottom cover and the bottom half of the cylinder are lowered on a special sleeve surrounding the piston rod, so exposing the piston. Extensive and successful trials * have been carried out in the makers' works at Wallsend-on-Tyne.

These fleets of double-acting four-cycle engined ships indicate the greatest step by way of technical progress yet made in the application of the oil engine to marine propulsion, and open up an entirely new field for internal combustion at sea.

## Geared Diesel Engine.

In Germany also another interesting development is the geared drive for Diesel engines. Having available at the end of the war a large number of submarine motors, these were pressed into service for motor ships, by coupling them to the propeller by means of gearing. In the case of the motor ships Haveland and Munsterland, ordinary single reduction gear was employed. The submarine type of engine was rated down in respect of mean pressure and revolutions to a figure likely to give reliable and continuous performance. The engine fly-wheels are coupled to the driven pinions by means of quills, so giving the necessary flexibility. With this type of motor, of course, torsional vibrations cannot altogether be eliminated, but if certain specified speeds of revolutions are avoided, the effects of the inequalities of torque do not appear to be seriously detrimental, and in addition to the two mentioned, a number of ships are being

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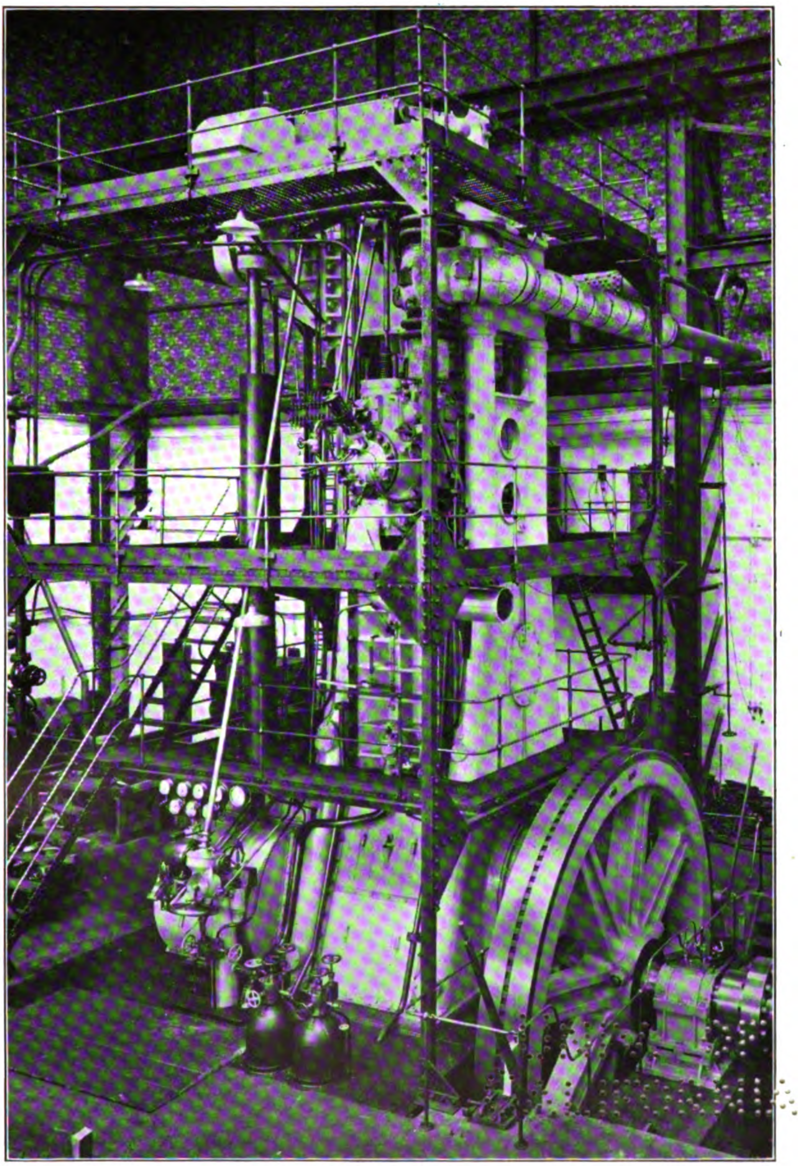
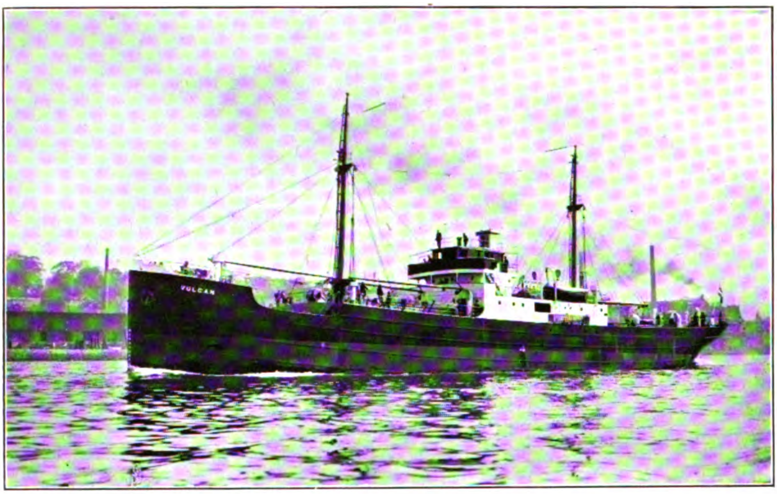
* See *Engineering*, vol. cxvii., pp. 707, 771.



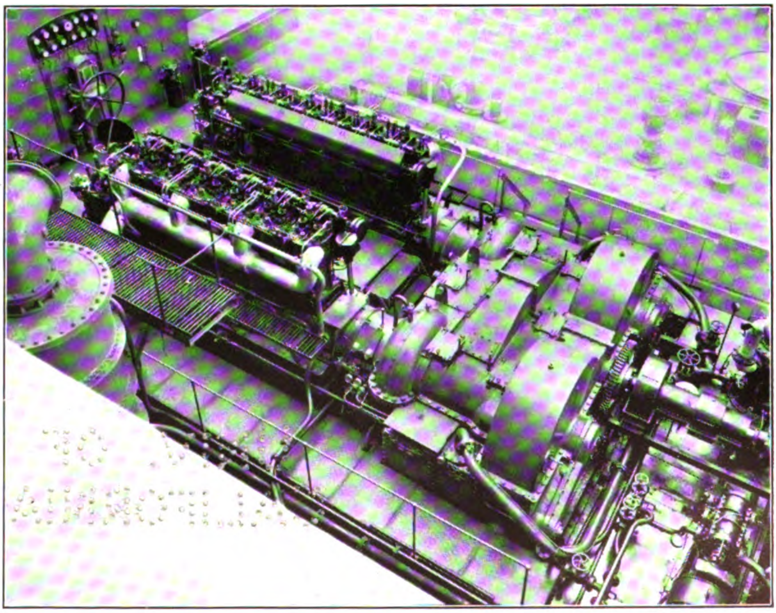
1000 I.H.P. EXPERIMENTAL FOUR-CYCLE NORTH-EASTERN-WERKSPOOR DOUBLE-ACTING DIESEL ENGINE.

*(Constructed by the North-Eastern Marine Engineering Co., Ltd.)*

Univ. of
California



M.S. VULCAN.



DIESEL ENGINES WITH FÖTTINGER OIL CLUTCHES AND REDUCTION GEARING, M.S. VULCAN.

*(Constructed by Messrs. Vulcan Werke, Hamburg and Stettin.)*

engined on this system, utilizing prime movers more specially adapted to the particular duties than are submarine engines.

Of great interest in this connection is the "Vulcan" system, where the Diesel engines are connected to the pinions of single-reduction mechanical gearing by Föttinger oil clutches—the function of the oil clutches being, primarily, to damp out the torsional oscillations, and secondarily to permit of uncoupling any engine from its pinion and of reversing the propeller shaft. In this way, four engines very conveniently can be coupled to one propeller, and eight engines would serve for a twin-screw ship, so making possible the installation of very great powers in a ship without involving cylinder units of other than well tried out dimensions. Careful experiments have been carried out in respect of the loss of power in transmitting the drive through these oil clutches, and have proved that the loss therein is not serious. A further advantage is the saving in head room, since the higher speed motors do not require the same space for installation and dismantling. This factor is of very considerable importance with passenger ships.

The motor ship Vulcan has made a trip, to the principal ports in Europe and America, demonstrating to naval authorities the ease of control and manœuvrability of this system, which unquestionably merits the closest attention. It might be stated that, in the case of the Vulcan, the type of prime movers adopted are submarine Diesel engines, and were installed because they were available and in order to demonstrate the efficiency and effectiveness of the particular form of geared drive. Further sets of machinery are now being constructed by the Vulcan Company for two 10,000 ton dead-weight single-screw vessels of 4,000 brake horse-power for the Hansa and Hamburg American Lines. In these latter installations the propelling units will be of the four-stroke-cycle single-acting type, conforming to marine practice in having crossheads, but utilizing steel castings for the main structural parts of the engine, such as bedplates, columns, and cylinders. Four engines, as already stated, can be coupled very conveniently to a single shaft. The type of Diesel engine that may be developed for this particular duty is in no way rigidly fixed. Owing to the multiplicity of similar sets and the great ease of disconnection for adjustment, it is not necessary to move with the same degree of caution and consideration as with machines direct coupled to the propeller.

## COST OF MOTOR ENGINES.

The most successful and satisfactory prime mover for the propulsion of the average ship is directly coupled to the propeller and runs at a low number of revolutions to conform generally to the best propeller efficiency in average weather and loaded conditions, giving good manœuvring qualities.

Massive units may be involved in the engine, and it is to an endeavour to avoid these huge parts that the geared drive, where oil engines are concerned, owes its inception. Whatever system is adopted, the first cost of the motor ship is high, and again to quote

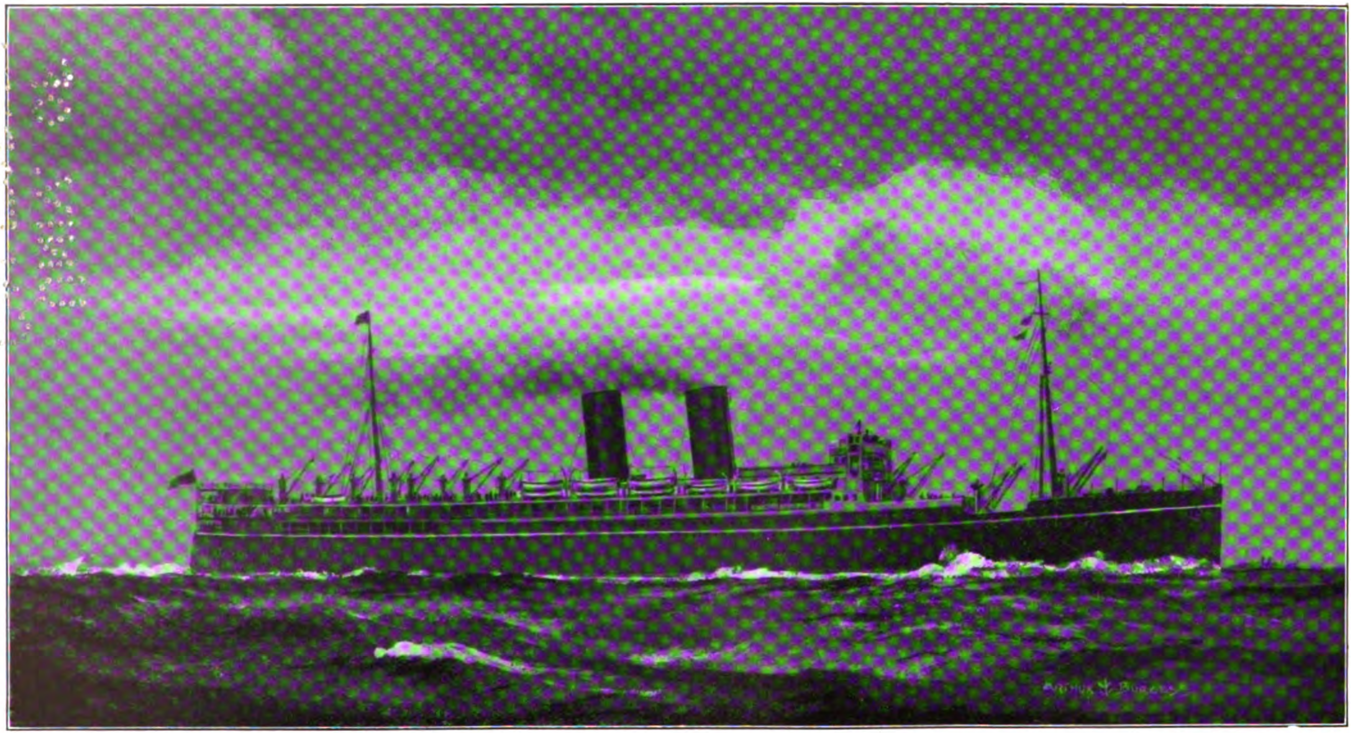
Sir Frederick Lewis, who is a keen advocate of the motor ship, "the very heavy initial cost as compared with other types of marine engines; the amount that is necessary to set aside for upkeep and depreciation is to some extent unproved," and many shipowners are faced to-day with deciding between the three alternatives, to build vessels in this country at uneconomical prices, *i.e.* prices upon which a return approaching that received from Government securities cannot be obtained; to build abroad at lower prices; or to wait until a commercially sound basis is reached. This, it must regretfully be admitted, is the position of many shipowners to-day.

What are the prospects of reducing the cost of propelling machinery of motor ships? Either less material per horse-power must be used, or a greater amount of horse-power must be obtained from the same material, which is only the same truth somewhat differently stated, and as such more correctly represents the line of probable development. To-day it would seem possible, in the directions which have been indicated in this chapter, to increase the heat quantity in the cylinder by imposing higher heat stresses on the combustion containing walls and so obtain greater power per ton weight of machinery without taking unjustifiable risks.

This would seem an entirely more favourable course than any reduction in the scantlings now standardized, having been arrived at after years of intensive experience and the accumulated data of many material failures. The adoption of double-action working on the two- or the four-stroke-cycle principles, with super-charging, are developments likely to lead gradually to a reduction in first cost. Competition between the great builders of internal-combustion machinery the world over will be extraordinarily keen for some time to come, and provided British marine engineers receive sufficient encouragement from the shipowner there would appear to be no fear whatsoever of falling behind technically in the race. Technical developments on a broad scale at home are in train which should go far to ensure continuance of our position and may even lead to a definite advance.

JAMES RICHARDSON.

UNIV. OF
CALIFORNIA



*(From a drawing by Arthur J. W. Burgess.)*

S.S. RAWALPINDI FOR THE PENINSULAR AND ORIENTAL STEAM NAVIGATION CO.

*(Under construction by Messrs. Harland and Wolff, Ltd.)*

# CHAPTER VI.

## PORT FACILITIES OF GREAT BRITAIN.

GREAT interest was aroused in the spring of 1924 by the publication of the first portion of the report of the committee appointed by the Chamber of Shipping of the United Kingdom, to inquire into the facilities of the principal ports of Great Britain. The issue of the report was opportune, as it coincided with the meeting of the International Shipping Conference in London, and was followed shortly afterwards by the meeting of the Baltic and White Sea Conference at the Hague. These bodies were thus able to consider the answers of an authoritative committee to the criticisms made by foreign shipowners in the previous autumn, alleging that considerable delays and much expense were incurred at British ports owing to the absence of modern loading and discharging facilities. The terms of reference of the committee, of which I had the honour to be chairman, were

> to examine the facilities of the principal ports of Great Britain and to make an immediate report to the Chamber as to the time and cost of loading and discharging in, and the facilities of, such ports as compared with Continental ports. That where there was excessive delay due either to lack of appliances, or inferior or out-of-date methods, recommendations should be made for modernizing or extending appliances and equipment or other facilities, and that, if necessary, the Government should be urged to assist the authorities concerned to provide these facilities either by grant or loan.

### SCOPE OF THE INQUIRY.

Arduous as the duties of the committee were, their work was light in comparison with that of the visiting committees that were appointed actually to inspect the ports, particularly what may be called the Provincial Visiting Committee. The duties of the London Committee were also heavy, as there are a number of docks in the Port of London the examination of each one of which entails work almost as great as that of one of the ordinary Provincial ports. A combination of the foregoing committees, assisted by local representatives, also reported upon Southampton and Bristol.

Twenty-seven ports were visited altogether. These ports, taking them in geographical order, were :—

Dundee.
Leith.
Methil.
Bo'ness.
Granton.
Grangemouth.
Burntisland.
Blyth.
Newcastle.
West Hartlepool.
Sunderland.
Middlesbrough.
Hull and Immingham.
London.
Southampton.
Bristol.
Cardiff.
Newport.
Penarth.
Barry.
Port Talbot.
Swansea.
Liverpool.
Manchester.
Glasgow.
Ardrossan.

Generally speaking, it may be stated that whilst the criticisms were to some extent justified, the foreign shipowners who made the complaints were evidently not sufficiently aware of the particular circumstances connected with the conditions of the ports, and of the extent of the difficulties with which British Port Authorities have had to contend. The Visiting Committees found that the Port Authorities, as a rule, were fully alive to the necessity for developing their ports. They showed a most ready appreciation of the efforts of the Visiting Committees, co-operated in every way with them, and gave sympathetic consideration to their suggestions. Various meetings took place between members of the committees and the different organisations concerned, and, in most instances, the improvements are being proceeded with. It is only right to say that many of the improvements had been already contemplated, and in some cases arrangements had been made for their fulfilment.

It has to be remembered that the four years of war and the five years of difficult post-war conditions were naturally more detrimental to British than to Northern European ports. The successful prosecution of the war had the first claim on the docks of the United Kingdom ; many of them were closed to ordinary commercial traffic and wholly devoted to Naval and Military purposes. During that period proper maintenance was impossible, let alone any question of development. This was more particularly the case, because one of the effects of the war was to increase the cost of capital expenditure by 200 to 300 per cent. and the Port Authorities naturally felt they could hardly be expected to incur large expenditure, especially seeing that the revenue was calculated at a much lower figure.

## The Life of the Empire.

The port facilities of the United Kingdom were the subject of inquiry and report by the Dominions Royal Commission which came into being in consequence of a resolution passed by the Imperial Conference in 1911, and it made its final report in 1917. It is worth while recalling the reasons which led a commission, appointed to inquire into and report upon methods of improving and extending the trade of the self-governing Dominions with each other and the United Kingdom, to go closely into the capabilities of British harbours. The final report set out * that the life of the Empire depends upon its sea communications, that cheap sea transport confers absolute advantages on countries which possess it, and that " the development of cheap, regular and efficient transport (and, indeed, of quick transport) depends in the last resort on increase in the size and draught of ocean-going vessels, and consequently on the existence of harbours and waterways of a capacity, and particularly of a depth, adequate to receive such vessels." The commission accordingly concentrated its attention on the question of depths and widths of the entrances and on depths of docks and harbours, and did not deal with the question of the suitability of the equipment of the ports for cheap and rapid loading and discharging operations. Dealing with

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* Final Report, Dominions Royal Commission. 8vo. edition, pp. 263 *et seq.*

its recommendations for the deepening and enlarging of Imperial harbours, the commission stated * "that it must be recognised that the enlargement and deepening of harbours on the scale commensurable with Imperial requirements may involve expenditure in excess of that which purely local requirements would demand. In such cases it would rest with the Government concerned to assist in providing the necessary additional capital and interest charges." The Chamber of Shipping in its terms of reference to the Port Facilities Committee was, therefore, adopting the views of the Dominions Royal Commission that Government aid could be properly applied to the extension and improvement of port facilities.

## THE VOLUME OF BRITISH TRADE.

The ports of the United Kingdom are the gateways in and out of which passes the most important foreign trade of the world. Concentrated on two small islands a population of over 45 million people carries on an active trade with all parts of the world, and builds and repairs not only the ships engaged in this trade but many ships the chief business of which is trade between foreign countries. In 1913 the total weight of the goods imported into the United Kingdom was 56 million tons (of which nearly 2 million tons were again handled at the ports in the form of re-exports), while the total weight of exports of United Kingdom produce and manufactures was nearly 92 million tons, including 77 million tons of coal, coke and manufactured fuel. Ships leaving British ports in the foreign trade also loaded over 21 million tons of bunker coal. These ships, of course, also loaded stores, but no information is available as regards the quantity of these. In the foreign trade alone, therefore, the ports dealt with over 170 million tons of cargo. The vessels entered and cleared with cargoes in the foreign trade totalled 117 million net tons.

These figures by themselves do not give an adequate picture of the volume of trade at the ports. There must be added first the vessels in the foreign trade which entered and cleared in ballast totalling 48 million tons, and the vessels which arrived and departed in the coasting trade, about 34 million tons with cargoes and 31 million tons in ballast. The coastwise cargoes handled in the ports must have totalled about 120 million tons in weight.†

We thus arrive at the following immense totals: The ports of the United Kingdom in 1913 accommodated 230 million net tons of foreign-going and coastwise shipping, and loaded or discharged 290 million tons of cargo and bunker coal. This last figure is in itself an under estimate as no allowance has been made for bunker coal shipped by coastwise vessels or for ships' stores. It also represents over 5 net tons of shipping and 6½ tons of cargo, for each inhabitant of the United Kingdom. The coastline of the United

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* *Loc. cit.*, *ante*, p. 285.

† In the above figures of coastwise trade, figures for "departures" only have been taken, as coastwise vessels "departed" at one port are of course arrivals at another; the estimated weight of the coastwise cargoes is 60 million tons. To arrive at the volume of coastwise cargo loaded and discharged at British ports, this figure has been doubled.

Kingdom is indented with ports and harbours, but 79 per cent. of the cargoes in the foreign trade, and about 50 per cent. of those in the coasting trade, are dealt with at the following ports *: Bristol, Cardiff, Glasgow, Grimsby, Hull, Leith, Liverpool, London, Manchester, Middlesbrough, Newcastle, Newport (Mon.), Southampton, and Swansea.

## STATE AID FOR PORT DEVELOPMENT.

These figures are sufficient to show that British ports play a part in the life of the nation, the importance of which it is impossible to exaggerate. Speaking generally, the Port Facilities Committee found that the majority of the ports were a wonderfully efficient instrument for British internal and external trade; they did find, however, that the four years of war and the five years of difficult post-war conditions have been more detrimental to British than to North European ports, and that while many of the ports had far-reaching schemes of development in hand, they were in some cases hampered by the present high cost of materials and labour. The Committee of the Chamber of Shipping recommended, as the Dominions Royal Commission recommended seven years ago, that in such cases State aid in the form of credit facilities or grants should be provided in the national interest. Incidentally, such acceleration of important harbour and dock improvements will help to relieve the present lack of employment. For the detailed recommendations in connection with individual ports, readers of the "Annual" will naturally consult the Report itself. The most important general recommendations are those urging better railway connections (in the case of London better road approaches), and the desirability, where practicable, of installing open wharf and tidal dock systems, as these are both more accessible, and involve a lower initial capital expenditure.

## INFLUENCE OF HIGH COSTS.

The chief reasons for the high cost of accommodating ships and handling cargoes at British ports, are the high capital cost of harbour works and the present high level of wages in the "sheltered" industry of dock labour. The former is reflected in high dock and harbour dues and the latter in the high cost of stevedoring. The Port Facilities Committee made an inquiry into the comparative cost of discharging bulk cargoes in British and Continental ports. This part of their report is not yet published, but the following preliminary figures may be given. The average cost of discharging bulk cargoes (grain, ore, sugar and timber) at twelve British ports in June, 1924, may be put at 12·3 pence per ton for pilotage, towage, dock dues and light dues, plus 25·6 pence per ton for discharging and tallying. The corresponding average for the four Continental ports of Antwerp, Rotterdam, Havre and Dunkirk is 5·2 pence per ton for the first items, and 16·0 pence per ton for the second.

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* Based on the Board of Trade and Ministry of Transport figures for 1921, the latest published.

British ports are thus handicapped to the extent of 7*d.* per ton of cargo by reason of greater initial capital charges, or perhaps to some extent by reason of dock authorities having maintained war increases in dues too long, and to the extent of nearly 10*d.* per ton by reason of higher labour costs at the ports. In fact, the cost of tallying and discharging at British ports is 60 per cent. higher than on the Continent, and this difference is practically the same as that between the minimum wage of 12*s.* per day at British ports as compared with 7*s.* 6*d.* per day at the Continental ports.*

### British and Continental Conditions.

It must not be overlooked that, so far as bulk cargoes are concerned, the conditions at British ports are not strictly comparable with those at Continental ports. Bulk cargoes of timber and ore are discharged in this country and coal is loaded at British ports, whilst the reverse is the case at many of the Continental ports with which comparisons have been made. In the summer of 1923, a strike of dockers occurred, which created much difficulty at British ports, and the Visiting Committees found that this had been a considerable factor in the acute congestion which prevailed in the summer and autumn of that year.

### An Expenditure of £20,000,000.

Generally speaking, as a rough estimate, the committee reached the conclusion that there is work already in hand in the ports of this country, or shortly to be undertaken, involving a capital expenditure of round about 20 million pounds sterling, and probably a larger amount will be expended in the near future. New docks are being built or authorised in many of the ports mentioned, new coal staiths are being constructed at some of the North East Coast and South Wales ports, quay extensions are being arranged at other ports, and the Great Western Railway Company has inaugurated vast improvements in the South Wales ports, where they are expending a large sum of money in renewing coal hoists, increasing siding accommodation, and considerably improving the crane power at those ports. The depth of water at the entrance of docks and harbours is also being dealt with at other ports, and the ultimate effect of all these undertakings will lead to improvements in the loading and discharging facilities of this country.

It may be claimed that the formation of the committee awakened interest in the various localities and spurred many of the authorities to greater activity.

As a sequel to the report of this committee of the Chamber of Shipping, the International Shipping Committee adopted the following resolution :—

1. That seaborne trade is of vital concern to the material well-being of the communities of the world.

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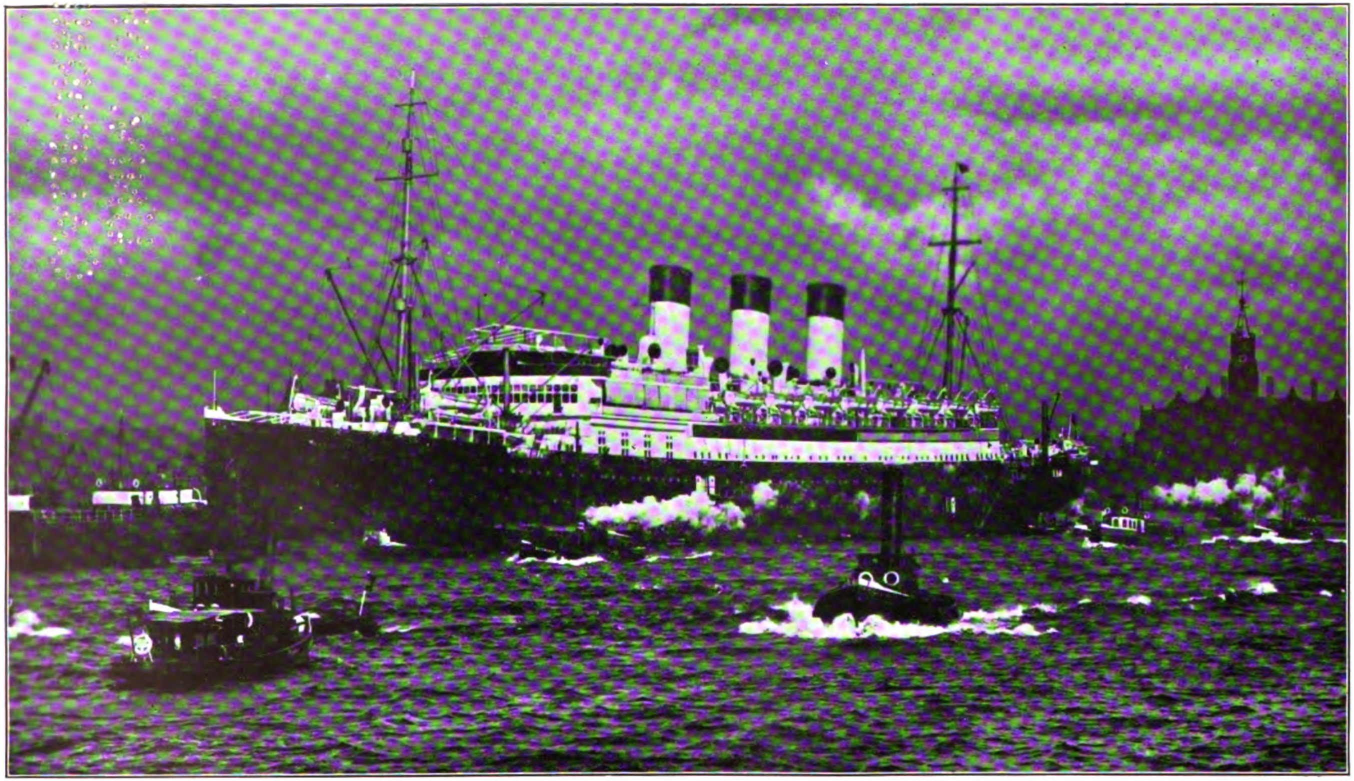
* Havre 5*s.* 6*d.*, Dunkirk 7*s.*, Antwerp 7*s.* 2*d.* per eight-hour day; Rotterdam 9*s.* 9*d.* per eight and a half-hour day.

2. That seaborne trade can only move freely and economically when the facilities of the seaports are adequate to the trade.

3. That therefore the bodies represented at this International Shipping Conference be urged to do all in their power to secure that the seaports keep pace with the requirements of trade.

There is reason to hope that as a result of the far-reaching inquiry into the conditions existing in British ports, and the improvements which are being made, increased attention will be given in all countries to the importance of facilitating in every way the loading and discharge of cargoes.

FREDERICK W. LEWIS.



S.S. CAP POLONIO, OF THE HAMBURG-SÜDAMERIKANISCHE DAMPFSCHIFFFAHRTS GESELLSCHAFT.

(*Constructed by Messrs. Blohm and Voss.*)

# CHAPTER VII.

## THE GERMAN MERCANTILE FLEET, 1918–1924.

WHEN on November 11, 1918, the Armistice was concluded, the major part of the German merchant fleet had been lying idle for over four years and many thought that now that the hostilities had stopped, international trade would begin again. As early as November 17 the British General on the International Armistice Commission proposed to his Government that British business people should come across to Spa to take up negotiations with German men of industry. Nothing came of this proposal, however, and it soon became evident that the blockade of Germany had not been raised through the cessation of hostilities but, on the contrary, extended along the Western land frontier of the Empire. The economic pressure thus brought to bear on Germany was enormous. The Armistice was first concluded for a period of thirty days only, the negotiations for its prolongation started two or three days before its expiration, so that Germany, rocked in the throes of Spartacist risings all over the country, was in a very difficult position at the different negotiations in Treves.

Under Article XXXIII. of the Armistice, Germany was bound not to transfer any of her ships to any neutral flag. Article XXVI. gave the Allies the right to seize any German ship at sea, and contained the following proviso: " Les Alliés et les Etats Unis envisagent le revitaillement de l'Allemagne pendant l'Armistice dans la mesure reconnue nécessaire."

### THE TRANSFER AND SURRENDER.

When the Armistice was to be prolonged the first time, *i.e.* in December, 1918, the German delegates were informed that the revictualling of the whole world, and particularly of Germany, would be accelerated if the German ships took part, operating in the inter-allied pool. After a declaration on the part of the Allies that the ships would, of course, remain German property and retain their German crews, the German delegates agreed, and requested that the necessary negotiations should begin immediately.

At the second prolongation of the Armistice, no steps having been taken regarding the ships or the revictualling in the meantime, Germany on January 16, 1919, signed an agreement which, in its Article VIII., stipulated that the whole German fleet be put " sous le contrôle et sous pavillon des puissances Alliées et des Etats

Unis" during the duration of the Armistice for the purpose of ensuring the revictualling of Europe and Germany, and that this measure "ne préjuge en rien de la disposition finale des navires," the Allies having the right to replace the German crews in part or in totality if they so desired, and paying for the use of the fleet "une remuneration appropriée qui sera fixée par les Governments Alliés."

No German shipping experts had been able to take part in the negotiations which preceded this agreement, as it had to be concluded within a few hours on account of the expiration of the Armistice. Negotiations based on the above agreement in Treves on January 17, and in Spa from February 6–8 and March 14–15, were abortive, chiefly because a definite assurance that Germany would be furnished with sufficient provisions, if the fleet were delivered, could not be given by the Allies, and because the question of the payment for the provisions by Germany could not be arranged satisfactorily.

On March 13, 1919, further negotiations took place in Brussels, and on the 14th, at 8.40 p.m., somewhat more definite declarations regarding the provisioning of Germany having been given, an agreement was signed which put the whole Mercantile Marine of Germany at the disposal of the Allies under the conditions of Article VIII. of the Agreement of January 16, *i.e.* the fleet flew the flag of the Allies, the German crews being discharged and a certain charter rate paid for the use of the ships.

### CONDITIONS OF THE SURRENDER.

On May 7, 1919, in Versailles, the Peace Conditions were handed over to the German delegates, which in Annex III., Article 1 to Part VIII. ruled that:

> "The German Government, on behalf of themselves and so as to bind all other persons interested, cede to the Allied and Associated Governments the property in all the German merchant ships which are of 1,600 tons gross and upwards; in one-half, reckoned in tonnage, of the ships which are between 1,000 tons * and 1,600 tons gross; in one-quarter, reckoned in tonnage, of the steam trawlers; and in one-quarter, reckoned in tonnage, of the other fishing boats."

In Article 3 it was further decided that the ships should include all vessels under construction. As no negotiations regarding the Treaty stipulations took place, the German delegates sent a reply in writing on May 29, proposing to give up the battleships provided for in the Versailles Treaty, agreeing to operate the Mercantile Marine in a world pool, placing a part of the earnings at the disposal of the Allies, and declaring Germany's willingness to build ships as demanded for the Allies in the German yards. This proposal, however, was rejected.

The Peace Treaty, which in its Article 297, i., bound Germany to compensate her nationals for the retention of their property in Allied countries, became valid on January 10, 1920. On this date all German vessels over 1,600 tons, and the half of the vessels between 1,000 and 1,600 tons, became the property of the Allies. Most of them were already in their hands, and those which remained in Germany had to be handed over as quickly as possible. The selection of the half of the ships between 1,600 and 1,000 tons, and of the ships under construction, was effected in London in May, 1920. Of the 5·2 million tons Germany had had before the war, about 3 million tons were left at its end; of these 2·3 million tons were delivered in ships over 1,600 tons, and 77,000 tons in ships between 1,600 and 1,000 tons. Of the ships under construction, totalling about 370,000 tons, 250,000 tons were delivered to the Allies. After all these deliveries, Germany retained a fleet of about 500,000 tons, with hardly any ship fit for overseas trade, and about 112,000 tons under construction.

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* Tons always means gross register tons, unless specifically stated otherwise.

## THE REBUILDING.

When the Great War broke out, the German ships which were at sea and could not reach German or Austrian ports took refuge in the harbours of neutral countries. The tonnage of the latter vessels amounted to about 2,340,000 tons, *i.e.* the greater part of the overseas mercantile marine of Germany. With the exception of the Baltic and coasting trade, German shipping ceased. Public opinion, the Government, and the Reichstag under these circumstances naturally took a great interest in the question of the replacement of these great losses. On November 7, 1917—the U.S.A. having entered the war and seized all the German ships in her ports—a law was passed called "*Gesetz über die Wiederherstellung der Handelsflotte*" (*Beihilfegesetz*)—*Reconstruction Law*—which empowered the Government to pay subsidies (Beihilfen) to the shipowner who built a ship to replace one lost or damaged through measures taken by any foreign Government since July 31, 1914. The subsidies to be given ranged from 20 to 70 per cent. of the value which the ship had on July 25, 1914, and were highest if the ship was commissioned within one year after the end of the war. Indemnities for the crews of the ships interned during the war were also provided for. The subsidies were given for the construction of cargo vessels and for passenger vessels only if they were chiefly destined for the carriage of goods. This proviso naturally had great influence on the type of the ships contracted for under this law. A special Government committee, the "Reichsausschuss für den Wiederaufbau der Handelsflotte," was formed for the execution of the law and the administration of the funds.

## INFLUENCE OF THE REVOLUTION.

When in November, 1918, the revolution broke out in Germany and the Armistice was concluded, great numbers of men flooded back from the front with consequent unemployment, disorder, depreciation of currency, and rise in prices. The owners who had ordered ships were not able to pay the sums due to the yards, who had financial and labour troubles themselves. The Government, fearing further and more serious internal troubles, owing to the necessity of disbanding the military forces, stepped in, and on February 27, 1919, signed an agreement with the shipowners and shipyards called the "*Ueberteuerungsabkommen*" (*Exorbitant Cost Agreement*).

By this very complicated agreement the shipowners bound themselves not to cancel their contracts and to place new ones if possible, a *Programme of New Construction* being fixed by a committee of two Government officials, one shipowner, and one shipbuilder. The Government, on the other hand, agreed to pay certain percentages of the costs, which exceeded pre-war prices by more than double, the shipowners having to refund a percentage of the monies to the Government later on.

At the same time (February 5, 1919), a new form of contract between shipowners and builders was drawn up, the *Regie-Vertrag,* which, taking account of the altered economic and currency conditions, provided that the yards should be paid their actual costs plus a percentage for management (Regie) fixed by the Reichsausschuss—constituted under the Reconstruction Law—and percentages for earnings and depreciation. On August 31, 1919, the Government by the *Enteignungsgesetz* (*Expropriation Law*) expropriated all property which had to be handed over to the Allies under the terms of the Versailles Treaty, agreeing to indemnify the proprietors in a reasonable manner.

## EFFECT OF THE CURRENCY DEPRECIATION.

In spite of Reconstruction Law and Exorbitant Cost Agreement, shipbuilding, however, lagged till a decision had been arrived at in May, 1920, setting forth which of the ships under construction were to be delivered to the Allies. After this, shipbuilding activities increased and the sums for which the Reichsausschuss had to apply to the Government swelled enormously, being puffed up by the currency depreciation. The Reichstag objected, and towards the end of 1920 it became more and more evident that the programme arranged for by the Reconstruction Law, *i.e.* replacement of all vessels lost—and provided for by the Expropriation Law—*i.e.* indemnification of the shipowners for all of their losses—could not be carried out.

The German shipowners, therefore, in conjunction with the shipbuilders, declared their willingness to give up their rights under the Reconstruction Law, Exorbitant Cost Agreement, and Expropriation Law if a lump sum, sufficient for the reconstruction of a part of their losses, were paid to them on the condition that the monies should be administered not by Governmental bodies, but by the shipowners and builders themselves. This latter stipulation was, of course, opposed by officialdom, and the Ministry of Finance cut down the sum as far as possible. After long negotiations, however, an agreement was arrived at. Amongst all the difficulties that had to be overcome, that of getting all the owners to agree as to the way the funds were to be distributed was not a minor one.

A contract, "*Reedereiabfindungsvertrag*" (*Ship Compensation Law*), was signed on February 23, 1921, subject to ratification by Parliament, by the Reederei-Treuhand-Gesellschaft on behalf of the shipowners and builders. The Reederei-Treuhand-Gesellschaft was an institution formed in October, 1919, solely for distributing an advance instalment of the indemnity provided for by the Expropriation Law to the owners who had delivered their ships to the Allies and for ensuring that these monies were used for the building of ships only. This institution had to be replaced immediately after the Ship Compensation Law was signed, by a new organisation, the Schiffbau-Treuhand Bank with a capital of 100 million marks subscribed by the shipping companies and yards, as the Government wanted the obligations imposed by the Ship Compensation Law to be assumed by an institution with sufficient capital, and in which all the yards and 95 per cent. of all the shipowners were represented. These obligations were: to reconstruct 2·5 million tons deadweight, and, failing to accomplish this, to pay back to the Government the current price of construction for every ton wanting in the above sum, and also to take over all the obligations hitherto resting upon the Government in connection with the hypothecation of German ships in Holland.

## Fund of Twelve Milliards of Marks.

This agreement, to which a lengthy Annex regulating all the details was added, provided for the payment of 12 milliards of marks inclusive of all payments, totalling about 5 milliards, already made for the rebuilding of losses and the reconstruction of the merchant fleet. The sum was to be paid in five annual instalments. In exchange the shipowners waived all their rights under the different laws. Ten per cent. of the sum was allowed to be spent for the purchase of ready tonnage in foreign countries; all the rest had to go to German yards. The smaller shipowners were favoured in many respects.

The whole work of distribution and administration was placed in the hands of the Schiffbau-Treuhand Bank, Government officials and members of the Reichstag becoming members of its different committees (Verteilungsausschuss—distribution of moneys; Ueberwachungsausschuss—control; Bauausschuss—regulation of the building programme). Shipowners who were not able to finance their contracts with the sums paid by the Bank and their own means, had the right to place the contracts at the disposal of the Bank, which was obliged to have the ships completed and could then dispose of them as it thought fit. The shipowners and builders had acquiesced very reluctantly in many points in this agreement, particularly the payment in yearly instalments and the inadequacy of the sum in comparison with the actual value of the pre-war fleet, and even with the amounts credited to Germany for her ships by the Allies. As the sum was also in no way sufficient for the construction of all the ships provided for in the Programme of New Construction, an agreement had been arrived at with the shipyards according to which only those vessels of the programme should be built whose keels were laid before December 31, 1921.

## Cancellation of Orders.

It soon became evident, however, that this restriction was not sufficient, and the whole organization of the Schiffbau-Treuhand Bank, with its collaboration of shipbuilders and owners whose interests in this question were not at all identical, was put to a very severe test. As, however, both parties had a common end in view, an agreement was arrived at in the summer of 1921, by which 100 keels were struck off the list and the orders cancelled. In spite of this curtailment, however, it was impossible—chiefly on account of the currency depreciation—to keep the work going in the yards, if the indemnity was to remain spread over five years. In view of this situation, the Government, in March, 1922, agreed to pay out the whole of the rest of the monies in five quarterly instalments.

But even this means proved inadequate as the mark was constantly racing down; the quarterly instalment of 781 million marks, worth about £500,000 on April 1, 1922, had, *e.g.*, a value of only £7,500 on April 1, 1923. The Bank in the spring and summer 1922, recognizing its complete inability to fulfil its obligation of rebuilding 2·5 million tons deadweight, called for a court of arbitration. The Government agreed, and the court on September 23 ruled that the Government should pay 18 milliards of marks to the Bank in seven monthly instalments, ending on March 15, 1923. The sum was to increase correspondingly if wages rose above a certain point. The Court declared that its decision barred all future claims, and the Bank had to agree thereto.

### Spirit of the Shipowners.

Through the rapid decline in the value of the mark, wages rose and the sums actually paid out of the Bank amounted to about 180 milliards of marks. All these figures, however, are irrelevant. In actual purchasing power the additional indemnity was worth about one-twelfth of the original one, *i.e.* the 12 milliards were increased to 13, whilst the building programme which the Bank had to take over from the Government required at that time about 15 milliards for its completion, and after its curtailment through the Bank about 18 milliards, on the basis of prices in April, 1922, were necessary. There was, therefore, a substantial margin which had to be spanned by the shipowners themselves, and when the last monies were paid out on April 1, 1923, the whole cost of completing the ships still under construction had to be borne by the owners.

Looking back on the work of the Schiffbau-Treuhand Bank one well may say that it was a splendid example of what can be achieved by whole-hearted co-operation, quite apart from the fact that the administration costs were a fraction of what a Government body would have required. In spite of the extreme complication of the Ship Compensation Law, in consequence of the various and often conflicting interests which had to be satisfied, no serious hitches occurred. On October 1, 1923, the Bank entered into liquidation.

### Reconstruction "at an End."

The reconstruction of the German mercantile fleet is at an end to-day; the stocks are empty with the exception of a very small number, of which the majority are occupied by orders from foreign countries. Under the control of the Schiffbau-Treuhand Bank, 299 ships of 1,567,000 tons deadweight were built in lieu of 1,316 vessels of about 7,500,000 tons deadweight, lost through war measures and the Versailles Treaty. The tonnage of the German mercantile marine increased from 1·4 million tons on December 31, 1921, to 2·3 millions at the end of 1922 and 2·8 millions in December, 1923.

Those shipowners whose ships were finished earliest have, on an average, made the most out of their compensation. They have, in some cases, been able to rebuild one-third of their losses out of the monies paid to them by the Bank. Those whose ships were the last in the programme will have received enough for a reconstruction of 16 per cent.

The general opinion, that currency depreciation is an economic advantage, is a fallacy in such generality. There are two sides to it, just as to everything else, and taking all in all those nations who have gone through a complete wreck of their money certainly are not eager for a repetition of the experience. The ships built in Germany since 1920 on an average have not been cheap; many have been excessively dear, chiefly on account of the Regie-Vertrag, which theoretically made it possible to build up and equip a whole yard at the expense of a single ship under construction there. The advantage in the cost of wages was, to a certain extent, counterbalanced by expensive material. Owing to these circumstances, the German shipowners have been obliged to build up their fleet in a time of falling prices of ships, which, in the bitter end, works out in a loss of almost 50 per cent. of the monies invested by the State and the owners in ship construction.

## Mostly Modern Vessels.

The fleet, of course, consists mostly of modern vessels, but there are many amongst them designed and begun before the war, but completed only quite recently. No passenger vessels being allowed by the Reconstruction Law, quite a number of cargo ships had to be altered into passenger vessels when they were already advanced in construction, so that they are somewhat makeshift. Diesel engines, on account of their importance for the submarines, were an object of suspicion by the Control Commissions and did not play the part they should have in the building up of a new merchant navy, the only big company that has an appreciable number of motor ships being the Hamburg-American Line.

As to the shipping companies in general, no important one has disappeared. The four which were the biggest before the war, Hamburg-American Line, Norddeutscher Lloyd, Hansa, and Hamburg-Süd, are still at the head of the list in the same sequence. As fifth we find a new-comer, Hugo Stinnes-Linien, and then follow in the same order as in 1914, the Deutsch-Austral, Kosmos, Woermann and Ost-Afrika-Linie, the Roland Linie having, however, pulled ahead and the Deutsch-Austral and Kosmos amalgamated.

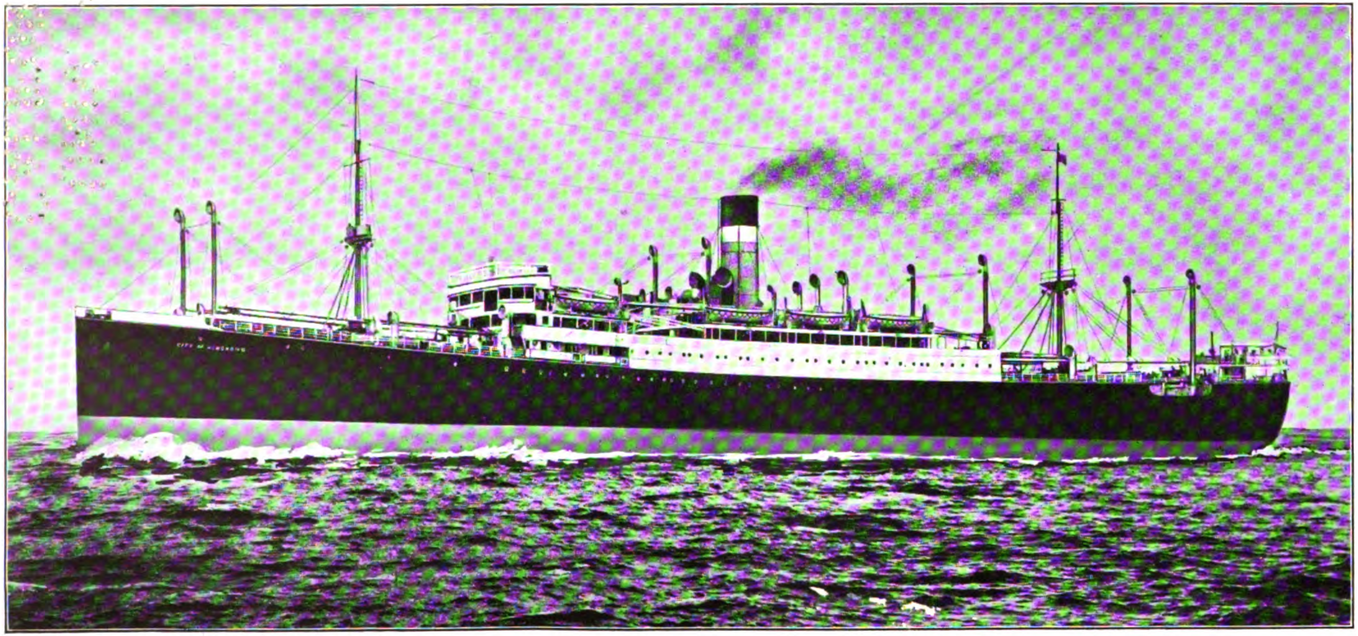
The work in connection with the Schiffbau-Treuhand Bank has led to a general understanding and appreciation of the value of co-operation, quite apart from the absolute necessity of cutting down costs wherever possible. One should not forget that the German shipping companies, with a few and unimportant exceptions, were all at a complete standstill during the war, without any earnings, but with all the expense of the upkeep of their organization. It can, therefore, be assumed that hardly any reserves are at their disposal and that the balance-sheets made up in gold marks, which have to be published before the end of this year, will show, like those already made public, how much of the substance has been lost. The old companies with a high pre-war standing, whose new tonnage is about a third of their old, will, of course, be able to hold their own, but many of the " Kriegsgründungen " (companies formed during the war and after) will probably disappear.

### German Shipping Re-established.

The whole situation as well as the present relative standing of the new German mercantile marine is best expressed by reference to its ships. There are no mighty ocean greyhounds fitted with the greatest luxury any more, but passenger ships equipped with a view to the greatest comfort and safety, and cargo steamers of serviceable types and sizes. These ships ply on almost all the trade routes served by German shipping before the war. The shipping companies have joined nearly all the pools and conferences of which they were members in 1914. German shipowners have again taken an active part in the work of the International Shipping Conferences, the International Law Association, the Comité Maritime International, and the Baltic and White Sea Conference. As far as it can be done with a fleet of modest size, German shipping has been successfully re-established in the world, with the exception of the places where it is still hampered or outlawed by post-war measures and restrictions.

The rebirth of the German fleet, after such a comparatively short time, has, of course, been much commented upon. The currency depreciation was probably an advantage in the beginning, but ultimately changed into the opposite. A certain amount of merit is certainly due to the leaders amongst the shipowners and builders who planned, negotiated, and carried through the Ship Compensation Act, and to the managers of the Schiffbau-Treuhand Bank. All their efforts would have been futile, however, if they had not been backed by general public opinion. The rebuilding of one-third of the losses, as provided for in the Compensation Law, was no boastful plan. Every German, be he of whatever party, recognized that it would only give to the country a mercantile marine absolutely necessary for its needs, and smaller than the fleets of Portugal and Greece in proportion to the number of inhabitants. The plan was supported, therefore, far and wide, and the Government assisted the development as much as it could in its financial distress. In spite of all the many difficulties, it was thus possible to build up the German mercantile fleet as it is to-day !

Leisler Kiep.



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# CHAPTER VIII.

## FLAG DISCRIMINATION.

THE question of Flag Discrimination has entered upon a new phase during the past few months. By Flag Discrimination I mean the practice, which has been adopted by many, if not all, maritime powers at some time or another during the past, of granting preferential treatment to ships under the national flag, in respect either of port and railway facilities or of shipping or port dues, taxes, etc., or in respect of the imports and exports or the passenger traffic of the country.

The history of this question is generally known in outline. It is best exemplified in the story of our own navigation laws. From the time of Cromwell until the middle of the nineteenth century, Great Britain adopted a strongly preferential policy. This policy was swept away in the middle of the last century and since that time both our overseas trade and our coasting trade have been completely free to the shipping of all nations, or rather the shipping of all nations has enjoyed absolutely equal treatment in regard to both these trades. The United States (the most important maritime Power next to ourselves) in 1849 also adopted a policy of freedom so far as her foreign trade was concerned, and, speaking generally, the policy of other nations has tended in the same direction, although the reservation of the coasting trade to the national flag has been generally made.

## INDICATIONS OF REACTIONARY POLICY.

There was, however, before the war a tendency on the part of various countries to reserve the emigrant traffic for their own shipping. This was specially the case with Germany, and seems to have been part of a deliberate policy of stimulation for the German Mercantile Marine. Germany was, of course, exceptionally well situated to obtain control of the continental emigrant traffic, since the great majority of such emigrants had to pass through German territory. It is probable, therefore, that she would in any case have obtained a strong hold on this traffic, but she was quick to make what has generally been regarded as unfair use of her exceptional opportunities. By establishing control stations on her frontiers under the supervision of two of the German trans-Altantic shipping companies, and by imposing certain conditions upon ships of other countries which desired to participate in the business, she greatly strengthened the position of German shipping in the Atlantic passenger traffic, and as a result also in the trans-Atlantic goods traffic, which has always depended to a large extent, upon passenger traffic as a basis. There seems little doubt, too, that Germany assisted her own Mercantile Marine by direct subsidies in the case, for example, of the Levant and East African trades, and on other routes probably by indirect subsidies which were made effective through the State railway system. The State ownership of the railways made it easy for the through-rates system to be worked to the advantage of German ships, which could be given a greater share in the rate than was allocated to foreign ships doing the same business. At the time of the war, however, in spite of the policy of Germany and some tendency on the part of other Powers to follow her lead, there is no doubt that the movement towards freedom of navigation was general.

### EFFECTS OF THE GREAT WAR.

The war introduced a somewhat different tendency. It is true that the Central Empires were no longer in a position to pursue their preferential policy, since they were expressly prohibited by the Treaty of Versailles from any such attempt. Other nations, however, were not so prohibited, and the effect of the war was, perhaps almost inevitably, to impress both upon belligerents and neutrals the importance of maintaining strong Mercantile Marines, while the intensification of national feeling tended in the same direction. These tendencies were particularly strong in the case of the United States. When Great Britain threw open her ports in the middle of the last century, the United States held a very strong position in the freight markets of the world. In 1860, for example, she had 2,379,000 gross tons in the foreign trade, while about the same time 94 per cent. of her imports and 86·5 per cent. of her exports were carried in American ships. During the next fifty years, while British shipping, under the policy of freedom of navigation, developed with astonishing rapidity, the United States share in the foreign trade diminished with a rapidity equally striking. By 1910, the United States had only 782,500 gross tons in the foreign trade, while the proportion of her foreign trade carried in her own ships, was less than 10 per cent. Even before the war, the dependency upon foreign shipping which this decline involved, had caused the United States considerable inconvenience. During the Boer War the diversion of British tonnage from the Atlantic routes for war purposes caused a serious shortage of shipping on those routes. During the Spanish American War, too, the States found her lack of tonnage a serious handicap. When America entered the European War her lack of merchant shipping was even more severely felt.

### POLICY OF THE UNITED STATES.

When, however, the war came to an end, she found her position completely altered. The tonnage under the American flag had actually increased by 570 per cent. since the beginning of the war, and although the British share in the world's tonnage had substantially decreased, the total volume of merchant shipping in the world was actually considerably in excess of that in existence before the war, while owing to the decline in trade the amount of traffic available was very much less. The United States were, therefore, obviously subject to a strong temptation to embark upon a protective policy in order to ensure a reasonable use for their greatly increased mercantile marine. It is well known that in 1920 there were actually introduced in Congress measures designed to carry out a policy of this kind. These contained provisions for :—

1. Subsidizing American shipping.
2. Preferential railway rates on through shipments by United States ships.
3. Deduction from income tax for shippers equal to 5 per cent. of the freight paid on goods transported in United States ships.
4. Restriction to United States ships of 50 per cent. of the immigrants.
5. Doubling of tonnage dues for the creation of a subsidy fund.

Proposals were also made at the same time for the extension of the Coastwise Laws to the Philippines and Virgin Islands.

These measures have never been put into operation, but they constituted a serious menace to the doctrine of free navigation which, before the war, had been winning its way towards gradual acceptance, nor was it surprising that other countries showed a tendency to follow in the same direction. Italy enacted a retaliatory law in regard to the transportation of emigrants to the United States. Portugal quadrupled the tonnage dues on foreign vessels, which were made to pay in gold at the par of exchange, involving an increase of 4,400 per cent. so far as British vessels were concerned. Spain doubled the tonnage tax upon vessels calling at Spanish ports which had not sailed from a Spanish port of origin, increased the emigrant tax payable by foreign companies, and finally in December, 1923, decreed a general levy upon all tonnage entering or clearing from Spanish ports, with the ostensible object of forming a fund from which compensation was to be paid to Spanish shipowners for war losses and requisitioning. In the eyes of foreign nations, this was simply a concealed subsidy for her own shipping.

## Action of the League of Nations.

It was plain, therefore, that unless some measure was taken to obtain international acceptance of the principles of free navigation, there was a serious danger of a drift back to a general system of discrimination and retaliation. The formation of the League of Nations enabled such a step to be taken. By Article 23 of the Covenant of the League it had been provided that "subject to and in accordance with the provisions of international conventions existing or hereafter to be agreed upon," the Members of the League, *inter alia*, "will make provision to secure and maintain freedom of communications and transit and equitable treatment for the commerce of all Members of the League." In order to carry out this obligation the First Assembly of the League appointed an Organization for Communications and Transit, assisted by an Advisory and Technical Committee.

At the first meeting of this Organization in Barcelona in 1921, a Convention was agreed for the regime of ports situated in international waterways as therein defined. Article 9 of this Convention prohibited in general terms all flag discrimination in respect of the use of such ports.

Following upon this, a strong move was made to induce the nations participating in the work of the League to adopt a general Convention binding the contracting parties to repudiate the principles of Flag Discrimination. This attempt met with very severe opposition, and indeed it is doubtful whether it could possibly have succeeded had it not been that at this stage the business interests of the nations concerned came together and definitely declared themselves in favour of the policy of freedom.

### OPINIONS OF CARGO OWNERS.

The views of the business community were strikingly shown in the following resolution passed at the Council meeting of the International Chamber of Commerce in March 1923:—

> This Congress notes with regret a growing tendency on the part of some nations to view the exports from and the imports to their countries as national commerce, and so to claim the right to discriminate in favour of vessels of the national flag against vessels of an alien flag, in regard to the marine transportation of such goods and passengers. The Congress considers that such action is contrary to international rights, because international commerce is not, and cannot be, the exclusive concern of any individual nation, and that while every nation is entitled to subsidize its own shipowners or traders, and to regulate and to restrict the amount of its exports and imports, emigrants or immigrants, no nation is entitled to claim exclusive rights in connection with its international commerce, or the transport of emigrants to or from other countries.
>
> The Congress therefore recommends that any attempt to restrict the carriage of goods or passengers between different countries to vessels sailing under the national flag of any nation by discrimination in any form should be strongly opposed as being contrary to international comity and disastrous to international commerce, the Congress being of opinion that the establishment and maintenance of commerce between the various nations on a sound basis can only be secured by equal opportunity to all ships under all flags in all parts of the world.
>
> This Congress further recommends that a permanent Commission on Maritime Transportation be created, consisting of one representative for each National Committee, under a Chairman, appointed by the Council, to examine questions, relative to maritime transportation other than Bills of Lading.

A further step was taken on November 9, 1923, at the meeting of the Council of the International Chamber of Commerce, in which cargo rather than shipping interests predominated. That meeting passed a resolution expressing the following conclusions:—

> 1. The freedom of maritime ports is essential to the restoration and prosperity of international commerce.
>
> 2. Cheap and efficient transport depends upon the vessels of all flags which carry the goods and raw material of commerce and their cargoes and passengers being treated by every country in all that concerns the use of the ports of that country and in all respects on a footing of equality with the vessels, cargo and passengers of that country.
>
> 3. It would appear that the authors of the Peace Treaty realized these facts, when

providing for Conventions to "secure and maintain freedom of communications and of transit and equitable treatment for the commerce of all members of the League."

4. The cost of every act which denies equality of treatment as between vessels of different flags being ultimately borne by the trading interests, the International Chamber of Commerce is deeply concerned in securing an international agreement which would ensure a real equality as between such vessels.

5. Any agreement which, while it seems to secure acceptance of this principle, admits of acts of a discriminatory character would be positively harmful and should not receive the signature of the maritime countries. For the same reason qualifications and reservations should be avoided.

At about the same time the Federation of British Industries passed a resolution in the following terms :—

Industry and Commerce require for their satisfactory development an open freight market which is a condition of the cheap and efficient distribution of goods and raw material. Discriminations which deny equality of treatment to vessels of all flags constitute a serious menace to the maintenance of such an open market. The Federation therefore hopes that the Government will do their utmost to secure that provision is made in the proposed Convention for true equality of treatment for flags of all nations.

Very shortly afterwards the draft Convention which had been prepared at the preliminary meeting of the special organization of the League of Nations, was submitted for final approval by representatives of the co-operating Powers.

There is no doubt that the above-mentioned strong expressions of opinion by the commercial interests of the principal countries of the world, very greatly influenced the minds of the delegates at the Conference. As a result, after considerable discussion, the draft convention was unanimously adopted by the representatives of thirty-one States, and the following are among those who have actually signed it: the British Empire, Denmark, Spain, Italy, Japan and Belgium.

It is too early yet for any State to have ratified the Convention, but four of the principal maritime nations are believed to be on the point of ratification.

## THE MARITIME PORTS CONVENTION.

The Draft Convention as finally agreed upon contains the following important provisions :—

Article 2. Subject to the principle of reciprocity and to the reservation set out in the first paragraph of Article 8, every Contracting State undertakes to grant the vessels of every other Contracting State equality of treatment with its own vessels, or those of any other State whatsoever, in the maritime ports situated under its sovereignty or authority, as regards freedom of access to the port, the use of the port, and the full enjoyment of the benefits as regards navigation and commercial operations which it affords to vessels, their cargoes and passengers.

The equality of treatment thus established shall cover facilities of all kinds, such as allocation of berths, loading and unloading facilities ; as well as dues and charges of all kinds levied in the name or for the account of the Government, public authorities, concessionaires or undertakings of any kind.

Article 5. In assessing and applying Customs and other analogous duties, local control or consumption duties, or incidental charges, levied on the importation or exportation of goods through the maritime ports situated under the sovereignty or authority of the Contracting States, the flag of the vessel must not be taken into account, nor may any distinction be made to the detriment of the flag of any Contracting State whatsoever as between that flag and the flag of the States under whose sovereignty or authority the port is situated, or the flag of any other State whatsoever.

Article 8. Each of the Contracting States reserves the power after giving notice through diplomatic channels, of suspending the benefit of equality of treatment from any vessel of a State which does not effectively apply, in any maritime port situated under its sovereignty or authority, the provisions of this Statute to the vessels of the said Contracting State, their cargoes and passengers.

In the event of action being taken as provided in the preceding paragraph, the State which has taken action and the State against which action is taken, shall both alike have the right of applying to the Permanent Court of International Justice through the Registrar; and the Court shall settle the matter in accordance with the rules of summary procedure.

Every Contracting State shall, however, have the right, at the time of signing or ratifying this Convention, of declaring that it renounces the right of taking action as provided in the first paragraph of this article against any other State which may make a similar declaration.

Article 12. Each Contracting State shall have the power, at the time of signing or ratifying this Convention, of declaring that it reserves the right of limiting (in accordance with the provisions of its own legislation) the transport of emigrants to vessels which have been granted special authorization as fulfilling the requirements of the said legislation. In exercising this right, however, the Contracting State shall be guided as far as possible by the principles of this Statute.

The vessels so authorized to transport emigrants shall enjoy all the benefits of this Statute in all maritime ports.

## Restrictions on Coasting Trade.

The acceptance of this Convention marks a new epoch in the history of free navigation. For the first time, the practice, which had been growing up amongst the more enlightened nations, has been made the subject of a general international agreement instead of being left to the initiative of individual States and made binding, if at all, by two-party treaties. Now there has been a declaration of policy, one might almost say a Confession of Faith, on the part of the leading peoples of the civilized world.

It must not, however, be assumed that this convention is the last word on the subject. There is at least one omission of very great importance, for the Convention is expressly stated not in any way to apply to the maritime coasting trade. The position in regard to this trade is that the British coasting trade is free to all flags, and that of almost all other nations is reserved to the national flag. The coasting trade is, of course, of very much less importance than the ocean trades. It is significant that, in spite of the apparently unfair position in which Great Britain is placed, a Special Committee representative of the shipping trade which was appointed by and reported to the Government in 1919, expressly reported against any change in our policy of freedom of the coasting trade. In point of fact, there is no doubt that in all countries, the national flag enjoys a great advantage in its coasting trade, owing to the fact that this can be carried on more satisfactorily in small vessels not suitable for ocean voyages, and also to the necessarily very close connection between coastal transport and domestic production and distribution. It is doubtful, therefore, whether, even if the coasting trade of other nations were thrown open, a very large share of the coasting trade proper of any country would pass to our flag.

## Defects in the Convention.

There are, however, some points of importance which it would be a great gain to us to establish. For example, there has been a regrettable tendency on the part of foreign nations to include within the scope of their coasting trade traffic between the mother countries and her overseas possessions. These are really foreign voyages and should be classed as foreign trade.

Although the Convention above-mentioned did not cover the coasting trade, a resolution was included in the final Act expressing the hope that all States, whether parties to the Convention or not, would support these principles, and in particular would abstain from the undue extension of the coasting trade.

Another defect of the Convention is the absence from the list of signatories of the U.S.A. As the figures already quoted indicate, the position of the United States in world transport to-day is one of very great importance, and she has shown symptoms of reaction towards a protective policy. It is to be hoped that the example of the other nations will lead her shortly to join them in the definite adoption of a liberal policy, or, at any rate, that she will abandon the attempt to adopt such protective measures as were outlined in the Shipping Subsidy Bill.

Another point in which the Convention did not cover the whole ground was in regard to through-traffic transported by land as well as by sea. This point was, however, covered by a Convention dealing with the international regime of railways, which was adopted at the same time by the same organization of the League of Nations. The relevant articles of this Convention may be summarized as follows :—

> By Article 4 the Contracting States undertake to give reasonable facilities to international traffic and to refrain from all discrimination of an unfair nature or directed against the other Contracting States, their nationals or vessels.
>
> Article 20 contains an undertaking to apply to international traffic tariffs which are reasonable both as regards their amounts and the conditions of their application, and to refrain from discrimination as in Article 4.
>
> By Article 21 the provisions of Article 20 are to extend to transport made up of a series of sections by rail, sea, etc., and regulated by separate contracts subject to certain conditions, and by Article 22 it is provided that Article 20 shall be equally applicable to internal as well as to international traffic by rail. Finally the protocol of signature contains the following important clause: "It is understood that any differential treatment of flags based solely on the consideration of the flag should be considered as discrimination of an unfair nature in the sense of Article 4 and 20 of the Statute on the International Regime of Railways."

## Uniform Sanitary Regulations.

Another point which the Convention does not cover is the effect upon world shipping of the existence of a great number of different systems of regulations dealing with safety, health, etc. Of course, so long as these regulations are enforced against national as well as against foreign shipping by each State, there is no actual discrimination to which legal objection can be taken; but it is obvious that regulations founded upon the local conditions of a particular country and specially adapted to its methods of ship construction, etc., may be extremely unsuitable and inconvenient to the shipping of another country, although if the country laying down these regulations does not send its ships into a wide range of foreign ports, the regulations will do very little injury to its own shipping.

The existence of a number of systems of this kind must very greatly hamper a merchant marine as widespread as our own. The British Flag covers a very much greater share of the tramp tonnage of the world than any other flag, and British tramp steamers cover a wider range of traffic than those of any other country. We therefore suffer from this existence of a diversity of regulations more than does any other country, and I should like to mention here, the valuable suggestion which has been made by the Council of the International Chamber of Commerce in the following terms:—

> Until countries which agree upon equality of treatment agree also upon uniform regulations, the application to national and foreign vessels alike, of laws and regulations for the design, equipment and government of ships in matters of safety and hygiene may in fact deny equality of treatment to foreign vessels.
>
> A practical method of reaching real equality of treatment has already been applied by certain States and is recommended for adoption as follows:
>
> When two States have similar but not identical laws and regulations affecting ships in matters of safety and hygiene, they are invited to agree mutually that vessels which satisfy the regulations of the one Power should be treated as if they had complied with the regulations of the other Power also.
>
> Pending the agreement of an international minimum standard, the effort to attain a reasonable minimum standard should be continued, and when accomplished, no more than the standard should be required by any State of any vessels other than those flying the flag of that State.

## PRESSURE ON RECALCITRANT STATES.

Before leaving the subject of the Convention I should like to emphasize the very great importance of the provisions of Article 8. This will enable those of the contracting States who really desire the carrying out of the Convention to join together in bringing pressure to bear upon any recalcitrant nation.

This power may be of very great importance in regard to the kind of difficulty which may arise under Article 12. This article gives any contracting State the right to limit the transport of emigrants to vessels fulfilling the requirements of special legislation in regard to such traffic. It is clear that this article might be used to cloak a discriminatory policy, such as that pursued by Germany before the war. If the other countries are in earnest they should join together and should be able to compel any country adopting a dishonest policy of this kind to abandon it.

The intention of the British Empire to act together in this matter was clearly shown in the Resolution on the Unity of Economic Defence passed at the last Imperial Economic Conference.

Enough has been said to show the great step forward which has been made on this important subject during the present year. It only remains to add a few general remarks on the broad principle at issue.

## VIRTUE OF FREE COMPETITION.

An impartial study of the history of modern navigation proves conclusively that the throwing open of our ports in the middle of the last century gave an enormous impetus to our merchant shipping, and the larger our share in the world's tonnage, the more important it is to us to obtain free access to foreign ports. Unfortunately, the result of the war has been to reduce rather substantially our share of the world's tonnage. None the less our interest in this matter remains unchanged, and moreover it is undoubtedly to the interest of the world at large (both to the consumers and the producers of commodities) that the policy of flag discrimination should be discouraged.

The restriction of traffic to any particular flag, or preferential treatment of any particular flag, can have only one object, *i.e.* to enable that flag to obtain more favourable terms for the traffic than it could do under a system of free competition. Leaving aside the question of defence as being one which is outside the realm of economics, this must mean a disadvantage to the nation, in so far as foreign trade is a necessity to it, since it must add to the level of freights and therefore to the cost of exports and imports. It must also lead to the use of unnecessary tonnage, that is to say, the employment of two ships where one would do, with the result that the cost of sea transport must be higher than it would otherwise be and producers and consumers must therefore suffer. The effect can best be shown by imagining discrimination carried to its logical conclusion. This would involve the restriction by each country of the whole of its export trade to its own ships which would return in ballast, thereby enormously increasing the cost of transport. If this was followed by a refusal on the part of each nation to accept imports except in its own ships (both these policies have been adopted in the past in different degrees), the result would be the complete cessation of all international traffic. The conclusion, therefore, seems clear, that although the policy of discrimination may temporarily benefit the shipping industry of a particular nation, in the long run it must be disadvantageous (economically speaking) to the traders and consumers of that nation and to the world at large, since it will inevitably lead (as it has generally done in the past) to a policy of retaliation on the part of other nations, and thus to a general waste of tonnage and increase in the cost of transport.

## Discrimination and Subsidies.

It is sometimes said that there is no distinction in principle between a policy of protection through a tariff on imports and a policy of protection by flag discrimination. If the comparison is confined to a policy of assisting national shipping by open subsidies, there is a good deal to be said for this view; but a distinction has always been made between an open policy of subsidy and a policy of discrimination, such as that defined in the first paragraph of this chapter. If an open subsidy is granted, the extent of it is clearly seen both by other nations and by the taxpayer, who has to find the money for subsidizing his own mercantile marine. I think we can be fairly certain that, in the present condition of the world, the taxpayer will not consent to any extensive or prolonged policy of subsidy. On the other hand, the advantages conceded to the national flag by discrimination in respect of port facilities, dues, etc., is concealed, and the burden of it upon the community concerned cannot be estimated. It is therefore a particularly insidious form of unfair competition.

I think the general feeling of British traders and shipowners is that the grant of this kind of concealed assistance is particularly noxious. It is to be hoped that other nations, and particularly the United States of America, will come more and more to share this view.

CHARLES TENNYSON.

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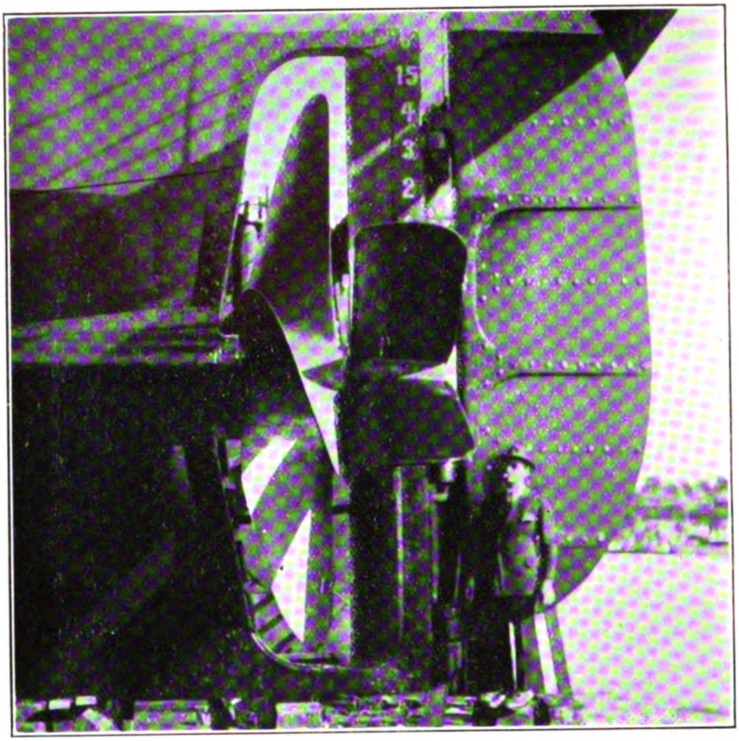
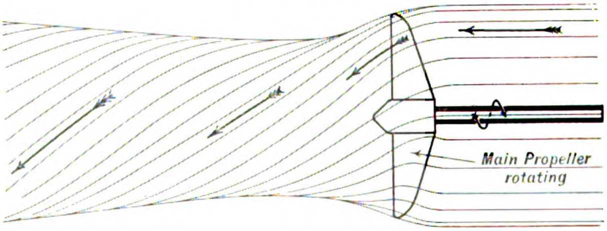
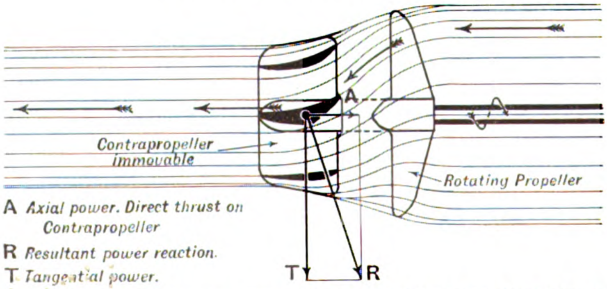


VESSEL FITTED WITH STAR CONTRAPROPELLER.

Propeller-jet without Contrapropeller



Jet with Contrapropeller


A
Contrapropeller immovable
Rotating Propeller
T
R
A Axial power. Direct thrust on Contrapropeller
R Resultant power reaction.
T Tangential power.

DIAGRAMS ILLUSTRATING ACTION OF ORDINARY PROPELLER AND CONTRAPROPELLER.

## CHAPTER IX

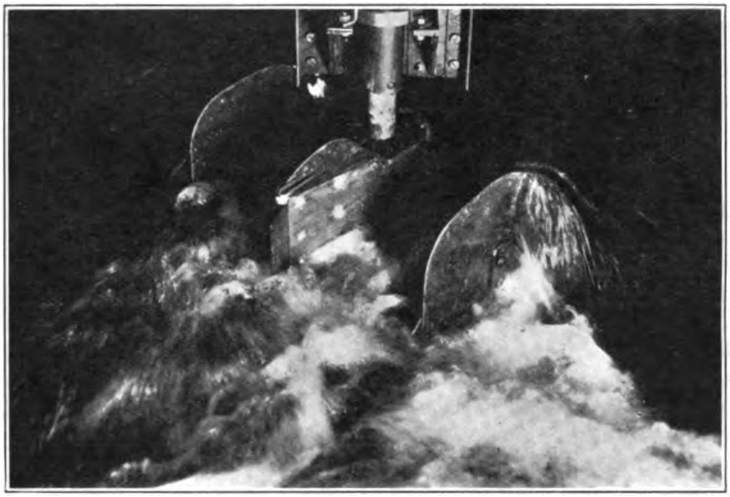
### EQUIPMENT OF MERCHANT SHIPS.

RECENT proposals and practices for improvements in the equipment of mercantile vessels have been legion. Some of them have been introduced on purely economical grounds, others have been induced by the demands of passengers for increased comfort, but within late years the greater number have been due either to the owners' desire to provide greater safety in emergency, or to legislation which has been framed to maintain a very high standard of safety. . The adoption of oil fuel, particularly for internal-combustion engines, has also brought about many changes in hull equipment and has given an impetus to electrically operated deck machinery for many purposes. Navigating apparatus has also been revolutionized during the past decade, and, generally speaking, equipment on shipboard is, to-day, of a higher standard than anything of a corresponding nature on shore.

While increased economy in transportation is mostly due to general design and to methods of construction and improved types of machinery, a very considerable amount of credit must be attached to equipment. The "Star Contrapropeller" illustrated on the Plate facing this page is an outstanding example of this, and from established information it is stated that savings in power to the extent of from 14 to 20 per cent. may be effected by the adoption of such equipment. The inventors evolved the idea of employing fixed guide blades attached to the vessel or to the sternpost forward or abaft the rotating propeller or on both sides of it. The effect of these blades, the action of which is illustrated in the diagram on the Plate opposite this page, seems to be somewhat similar to that obtained by the contrary-turning propellers revolving above the same axis, the classical experimental results on which were laid before the world some years ago by Colonel Rota, of Spezia. The practical difficulties involved in the application of contrary-turning propellers, however, are not encountered with the fixed guide blades, which, during the last three years, have been fitted on about 80 vessels of all sizes.

### THE EVOLUTION OF THE RUDDER.

Until recently, it was generally considered that the orthodox type of rudder was the essence of simplicity and also gave all that was required for manœuvring. but a number of inventions have been brought forward which show that efficient steering can be obtained from rudders which require only a fraction of the power at present necessary for operation. The McNaught double-bladed rudder is an outstanding example of such claims, and the inventors state that the turning power in a loaded ship with their rudder would be only a fraction of that necessary for an ordinary rudder.



Water Flow through Flettner Rudder.

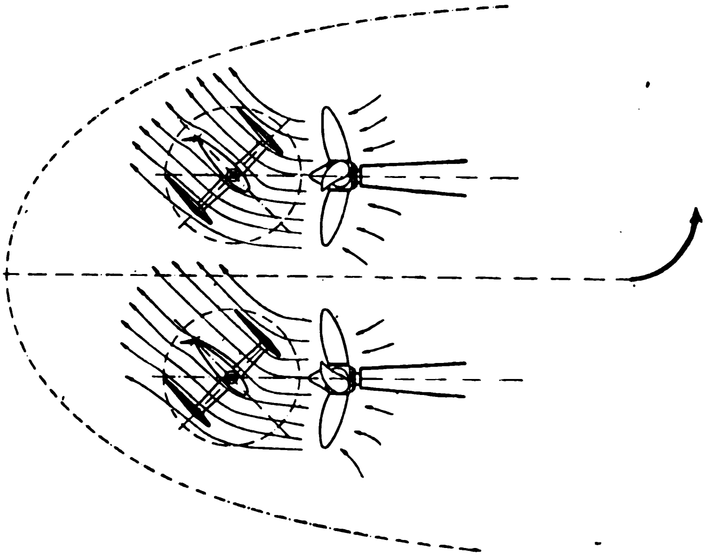


Diagram Illustrating Action of Flettner Rudder.

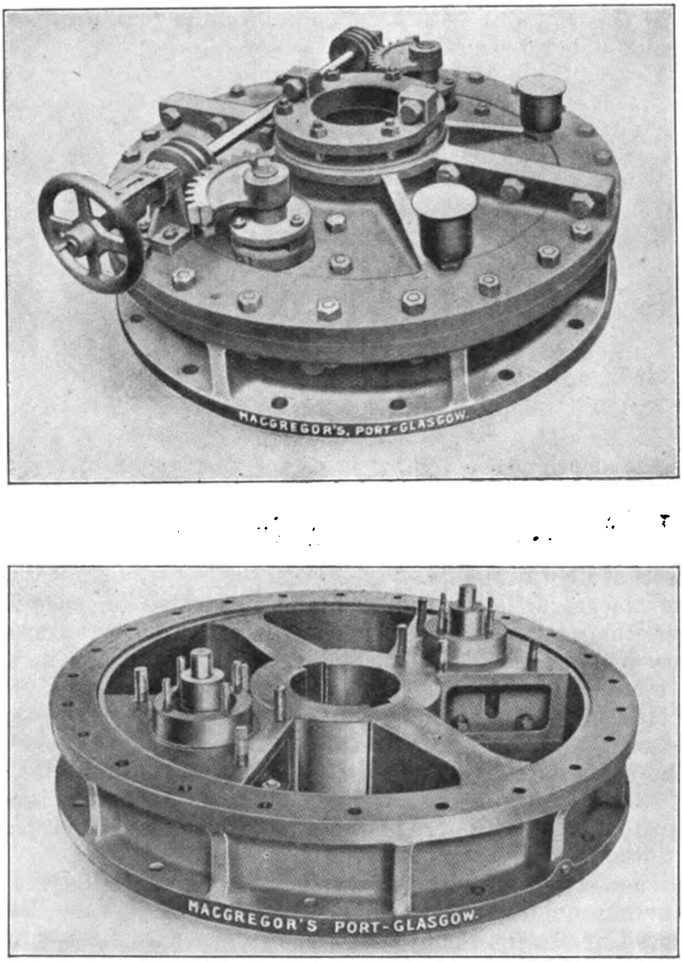
The "Flettner" rudder system has similar claims for economy. This rudder, the action of which is illustrated above, is made alternatively with a single blade of approximately normal shape or with three parallel blades arranged on one stock. In either case the rudder is balanced, and is operated by a small secondary rudder attached to the after edge. On moving the secondary rudder, a pressure is set up at the after edge of the rudder, acting in the opposite direction to the main centre of pressure. This results in the rudder taking up a position of equilibrium in the current or slip-stream, its angle to the centre-line of the ship being dictated by the angle between it and the secondary rudder; the secondary rudder has an area equal to about one-twentieth of that of the main rudder.

The secondary rudder is operated through suitable gearing housed on the main rudder head, and connected to it by a shaft passing through the hollow stock of the main rudder which is completely encased. Since a saving in power of 96 to 98 per cent. has been found practicable, it is possible to steer ships up to 10,000 tons direct by hand, without the need for intermediate auxiliary power, thus making it of especial value to motor ships. The Flettner rudder reverses itself automatically when going astern, the entire rudder swinging round through 180 degrees. Owing, however, to the special design of the gearing by which the secondary rudder is operated, the effect produced by the wheel is the same under these conditions as with a normal rudder.

As the depth of blades for both the McNaught and Flettner systems is only about one-half of that required for ordinary rudders, it is possible to have them almost fully immersed under all conditions, and that factor should greatly improve the steering qualities of vessels at light draughts.

The Macgregor liquid rudder brake, illustrated on page 254, is another item of equipment which merits attention. It consists of a rotary piston attached to the rudder stock, and works in a subdivided casing which takes the place of the usual deck stuffing box. Movement of the rudder forces liquid from one compartment of the casing to another and a cushioning effect, which can be varied in intensity, is obtained, which reduces vibration and shock on the gear. In the event of a serious breakdown at sea, the brake can be adjusted so that the rudder may be held in a rigid position while the necessary repairs are effected.

Another invention which increases the propulsive efficiency and manœuvring qualities of certain vessels is the "Vane Wheel" introduced by Messrs. Denny, of Dumbarton, which consists of twin wheels with helical shaped blades having their centres above the water-line. The accelerating and retarding qualities of the experimental shallow-draught vessel fitted with Vane wheels are greatly superior to those obtained with ordinary screws, and, in addition, it has been found that when one wheel is driven ahead and the other astern the vessel turns upon her own axis. This Vane wheel system has great merits in respect of propulsive economy, the trials of an experimental vessel showing a saving of about 30 per cent. in power compared with the same vessel when propelled by under-water propellers. As the wheel shafts are above water, the blades can be repaired without the necessity of dry-docking the vessel, and the stern bush, being out of the water, is not subject to the rapid deterioration which takes place under water in rivers charged with grit and sand. These considerations ought to be an inducement to instal the system for river services where docking facilities are not readily available.



The Macgregor Liquid Brake for Rudders.

## Comfort in Passenger Vessels.

In passenger vessels the maximum of comfort is a *sine quâ non* which has encouraged the introduction of many innovations. An even distribution of fresh air and heating is a vital necessity which has been met by the application of the thermotank and punkah louvre systems, originated by Mr. A. W. Stewart, of Glasgow, some years ago, and now installed in the majority of passenger ships.

Absence of rolling, as far as possible, is desirable in all ships, and although the tendency has been to obtain this by a proper adjustment of the dimensions and form of the vessel, and by the arrangement of weights on board, some owners have favoured mechanical means such as anti-rolling tanks and gyroscopes. There is no doubt that such apparatus has a very considerable damping effect upon a vessel's transverse movements, and it is unfortunate that the additional weight and expense attached to these systems discourage their adoption under ordinary circumstances.

A matter of great importance in passenger ships, especially in those handling cargo at intermediate ports, is that they should have cargo gear which will cause the minimum of noise. The ordinary steam winch has many objections on account of the noise at the winch, the possibility of " water-hammer " in the steam pipes, and the obstruction caused by the steam pipes on deck. For these reasons, hydraulic cranes are often installed in better class vessels. With the introduction of oil engines and the large electric generators usually associated with them, the tendency now is, on the score of economy, to instal electric winches (although these are not absolutely noiseless), because the engine-room generators are available for driving them in port. There are two designs of such winches, spur geared and worm geared, and the latter, although at a disadvantage in efficiency, is often adopted because it runs more quietly. The earlier designs of electric winches often gave trouble to naval architects because of their proportions ; they were either short and very wide, or very long and narrow. Suitable designs with proper proportions, however, have recently been introduced by several of the principal makers. As an alternative to winches the adoption of electro-hydraulic cranes has been considered, and an interesting system for these was recently put forward by Messrs. MacTaggart, Scott, of Edinburgh ; it consists of having individual motors situated in compartments beside each crane, and this arrangement induces economy in power.

Electric cooking gear is now fairly general for passenger ships and has also been adopted for a number of cargo vessels ; the cleanliness associated with such a system makes it highly desirable.

## FURNISHINGS FOR THE CABIN.

Although the passenger is intimately concerned with all the foregoing items, his thoughts generally are towards comfort in his living quarters. Past practice shows that ordinary berths, one above the other, in association with a settee have been most favoured; but of late the traveller seems to dislike the idea of having another sleeping above him, and this has induced some owners to fit cot bedsteads. While these fittings are desirable from some points of view, it will be apparent that one bedstead will displace the settee in an ordinary sized room, and it is therefore doubtful whether this is an all-round improvement. The settee has always been a useful item of furniture—for sitting on by day, and for laying out clothes at night.

Another fairly recent practice, which owes its origin to the demands of passengers, is that of laying on water to the state-rooms. It will be generally admitted that this also is a desirable arrangement if, but only if, there is ample storage space for the water, and also if deadweight is not an important factor. Practice has shown that it is a very wasteful system and very difficult to control; a thousand tons of water does not last very long in a large ship, and possibly it is better to follow the old practice than to have a shortage in mid-ocean.

The minor furnishings of state-rooms are very complete to-day, embracing all the requirements travellers can desire. In one case the owners have gone so far as to arrange little footsteps on the bulkhead so that passengers need not stoop unduly when tying their shoelaces. With regard to other "comforts," it has been reported that the Norddeutscher Lloyd have decided to instal a brewery on board the new liner Columbus, so that passengers may have fresh supplies of beer during the voyage.

## Increased Safety.

As already stated, increased safety has induced more new ideas in hull equipment than anything else. A number of those in use to-day were practised prior to 1912, but undoubtedly the international legislation following the Titanic disaster has been, in some measure, responsible for most of the following: Gear for handling lifeboats, emergency lighting and power supplied by plant placed above the bulkhead deck, power control for doors in watertight bulkheads, methods of pumping water from holds when the engine-room pumps are out of action, means for controlling the spread of fire, and wireless telegraphy. On the other hand, shipowners generally have shown, quite apart from legislative enactments, that they are increasingly alive to maintaining the highest standard of safety compatible with the economical operation of their ships, and Sir Alan Anderson, and others, have shown that, in some respects, as has been pointed out at the International Shipping Conference, the convention concluded after the Titanic disaster is not in the interest of safety. It is widely recognized by those who have practical sea experience that, as the President of the Chamber of Shipping has declared, "the unsinkable ship is a myth," and that such regulations as are imposed on shipbuilders and shipowners should have regard to sea conditions and should not, in pursuit of an unrealizable ideal, make sea travel impossibly costly.

## Passengers and Boat Facilities.

It may be taken for granted that means for stowing and handling lifeboats have induced most of the new ideas for life saving. Efficient sub-division and all the accessories attached to it may, under certain circumstances, be the means of keeping a damaged vessel afloat, but such means are hidden from the view of the uninitiated, and the ordinary passenger will naturally look towards the boat appliances as a first means of safety. The matter of providing "boats for all," however, is very involved in the case of large passenger liners, as it is difficult, in the first place, to find stowage space for them, and still more difficult to handle them with the necessary expedition in case of need. Too many lifeboats may indeed prove worse than too few.

Numerous appliances have been designed for transporting boats across the decks to the lowering stations, but none of these has been really satisfactory on account of the amount of time required for operation. There is also a serious loss of time in lowering the boats from the deck to the water in these large vessels, and the only remedy suggested for this difficulty is the adoption of single wire falls; but as this arrangement cannot readily be made "foolproof," it has not found general favour. The method of swinging the boats into their lowering position has also given rise to many innovations, but, it can be said, with reasonable certainty, that the time-tried system of turning davits is still the first favourite; although a considerable number of owners have adopted quadrant types of gear. With the ordinary davits, some kind of mechanical turning appliance is required for swinging them when the vessel has a list, and one of the most powerful and efficient of these is the Turnbull gear, which has now been fitted in a great many vessels. It is illustrated on the Plate facing page 261. The most recent system known to the writer for turning davits is by hydraulic means: the valve gear is fixed on the davit and can be operated through piping by small hand pumps placed in any convenient position, and preferably well clear of the men who are handling the falls.

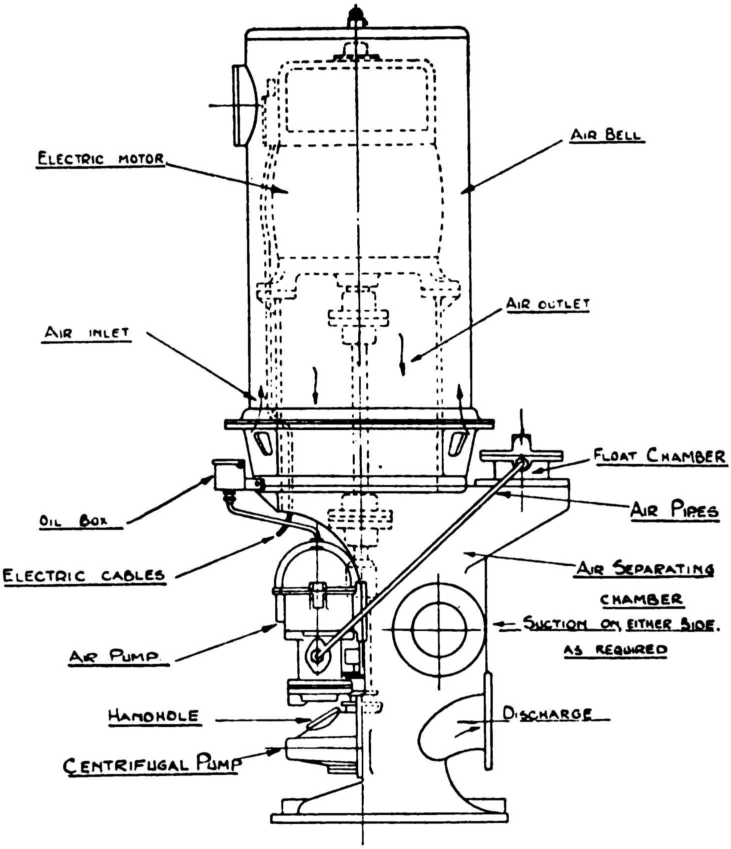
## BOAT LAUNCHING DIFFICULTIES.

The Regulations relating to Life Saving Appliances, which have been in force since shortly after the Titanic disaster, have been reviewed during the past year by a Special Commission appointed by the Government, and the gist of their report concerns the difficulties of successfully launching lifeboats in cases of extreme emergency. Their contention is, in fact, that it would not be reasonably possible to utilize all the boats which must presently be crowded one above the other upon a passenger liner, and they therefore advise that light rafts which would float off a sinking ship, or which could be thrown overboard, should be substituted for a portion of the number of boats presently required.

The Committee state that, in their view, the heavy lifeboat, which was originally necessary to convey people from an abandoned vessel, is not now of such great importance owing to the radical changes which have taken place in connection with ocean travel. In the old days, the boats might have been required to convey people hundreds of miles, whereas, to-day, it is a case of calling in by wireless the aid of other ships, and the problem might often become that of finding the best means of keeping people alive for minutes until assistance arrives. They therefore recommend the acceptance of a cardinal principle that no extra boats should be carried if they will impede the launching of those actually attached to the davits, or if they interfere with the marshalling of the passengers, because it is unlikely that the extra boats would be available in any case when a vessel sank rapidly.

## EMERGENCY POWER PLANT.

The emergency electric power plant, which is now required to be placed above the bulkhead deck of passenger vessels, serves many useful purposes, including lighting of decks in way of lifeboats and supplying power for working pumps, watertight doors, steering gear, etc. If the plant is adapted so that it can be connected to the ship's lighting cables, it is possible to dispense with the secondary means of lighting required by our laws. Generally, its advantages are so many that this requirement has been favourably received by all shipowners.



DRYSDALE EMERGENCY BILGE PUMP.

The power emergency bilge pump is also an item of equipment which has received general favour, for it is admitted on all sides that hand and Downton pumps are quite useless for the size of vessels which prevail to-day. These power pumps are usually situated in the engine-room and are operated by power from the main and emergency dynamos. The illustration on the opposite page shows the Drysdale type of pump which has been very satisfactory in service and can discharge water from any compartment at about 100 tons per hour or perform other duties to satisfy the working conditions.

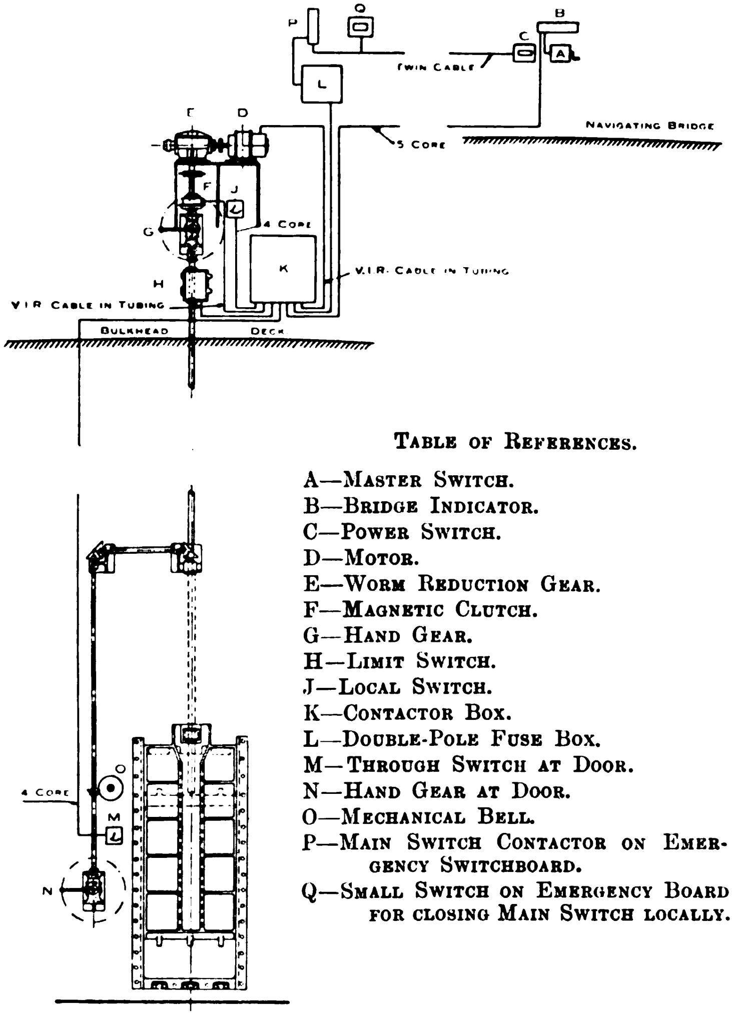


TABLE OF REFERENCES.

A—MASTER SWITCH.
B—BRIDGE INDICATOR.
C—POWER SWITCH.
D—MOTOR.
E—WORM REDUCTION GEAR.
F—MAGNETIC CLUTCH.
G—HAND GEAR.
H—LIMIT SWITCH.
J—LOCAL SWITCH.
K—CONTACTOR BOX.
L—DOUBLE-POLE FUSE BOX.
M—THROUGH SWITCH AT DOOR.
N—HAND GEAR AT DOOR.
O—MECHANICAL BELL.
P—MAIN SWITCH CONTACTOR ON EMERGENCY SWITCHBOARD.
Q—SMALL SWITCH ON EMERGENCY BOARD FOR CLOSING MAIN SWITCH LOCALLY.

SCOTT-ROSS PATENT CONTROL GEAR FOR WATERTIGHT DOORS.

The general introduction of oil as a fuel for passenger ships has enabled designers to dispense with a great many of the watertight doors which were necessary below the waterline when coal fuel was used ; but where a number of doors are still required, it is desirable that they should be worked by some power contrivance so that they may be closed simultaneously from the bridge in the event of a mishap occurring to the vessel.

Hydraulic gear has been satisfactorily used for this purpose for some years now, but recently there has been a decided tendency to adopt electrical power, principally because of the advantage that the doors can be worked from the emergency dynamo, and also because of the extra space gained in the engine-room due to dispensing with the hydraulic pumps. The diagram on page 259 shows the Scott-Ross type of electrical gear which has been fitted in a large number of ships, and it will be seen that the shafting, which is operated by the electric motors, also serves for the hand-gear drive.

Firescreen bulkheads are now required by the Board of Trade for passenger ships, and with a proper arrangement they should be useful for confining the longitudinal extent of a fire. Their introduction has given considerable trouble in some ships with regard to tonnage measurement, and this disability is another very good reason for amending our obsolete tonnage laws.

## PROBLEMS OF NAVIGATION.

The advantages of wireless telegraphy are so widely known that it seems unnecessary to enlarge upon them here, except to remark that, on account of the amount of traffic on the seas to-day, wireless is the most powerful factor where life-saving is concerned, since by its means assistance is readily obtainable, and especially in view of the developments which have been made with direction-finding apparatus. It is also unnecessary to state that the developments in broadcasting and its application on shipboard are a source of amusement for passengers, apart from its usefulness in supplying news.

Very considerable progress has been made in recent years with navigating instruments, including those for sounding, steering, and for transmitting instructions. The exhaustive investigations conducted by Mr. E. A. Sperry regarding the losses in speed due to yawing are of very great interest, and show that, due to the manner in which an ordinary magnetic compass swings when a vessel rolls or yaws, it may be very misleading to a quartermaster; also that the losses may be accentuated if he endeavours to anticipate the effect of such movements. The use of a gyro-compass has done much to reduce these losses because it is not sensitive to the movements I have referred to. They have been further reduced by such mechanical steering appliances as the gyro-pilot, an example of which is illustrated on page 261. The inventors of this apparatus claim that a 10-knot vessel will make about an additional 7 miles a day, which is made possible by the elimination of compass-card oscillation and by the immediate application of the helm, resulting, as it does, in less resistance because of the relative absence of yawing and the lesser braking effect on the vessel's progress due to the reduction in the extent and frequency of rudder movement.

The advantages of mechanical sounding machines have been so fully proved, that the old-fashioned lead line, which often could not be properly used unless the ship were stopped, has been consigned

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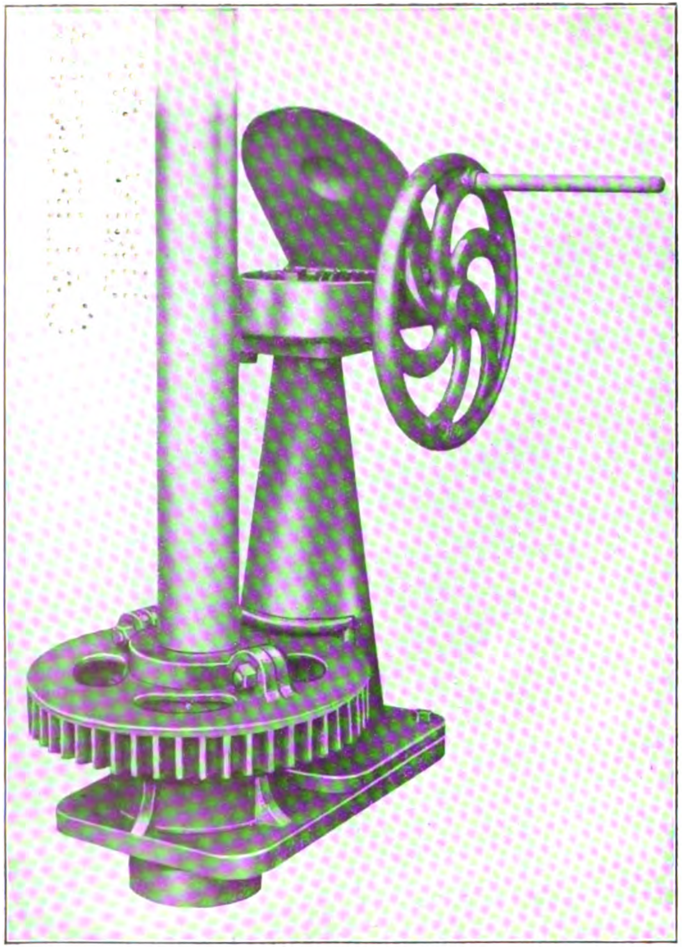
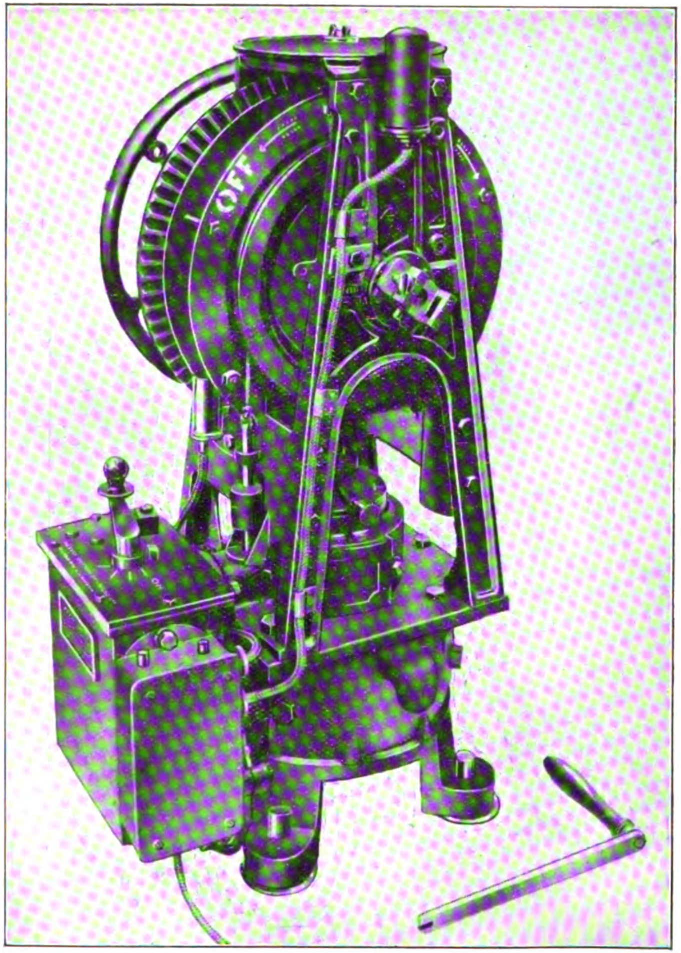


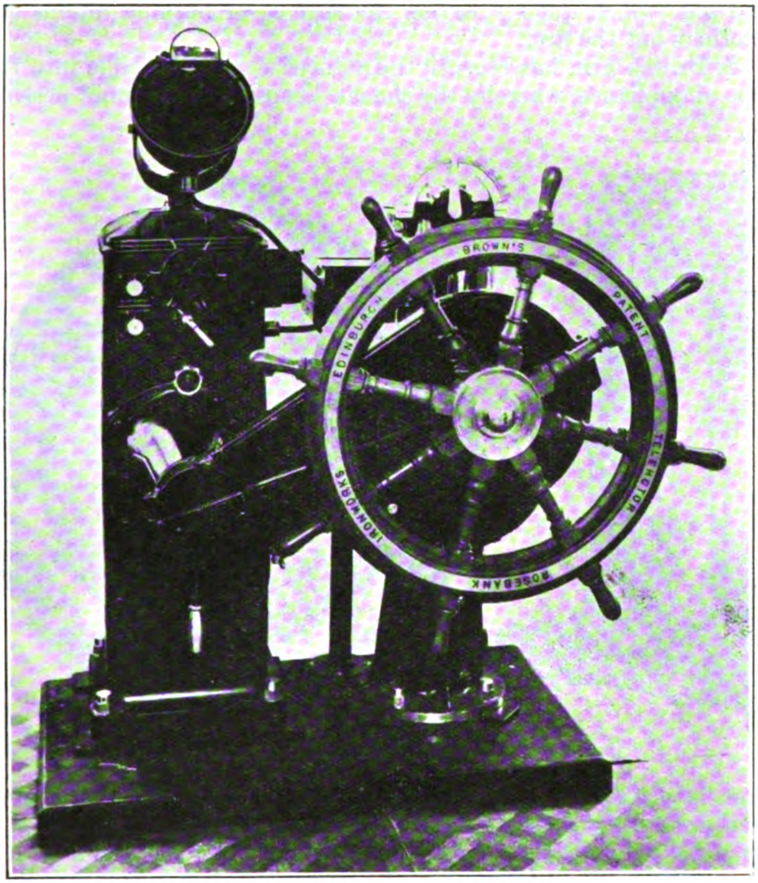
THE TURNBULL DAVIT TURNING-OUT GEAR.



THE "KELVITE" SOUNDING MACHINE.

to the position of an emergency appliance. The "Kelvite" motor machine, which is illustrated on the Plate facing this page, is an indication of the high standard attained with such appliances.

Revolution indicators are now more or less standard fittings in the navigating compartment, and a recent innovation is a recorder on the bridge worked from the reversing engine control lever, which confirms that the instructions transmitted by the telegraph from the bridge to the engine-room have been correctly put into operation.



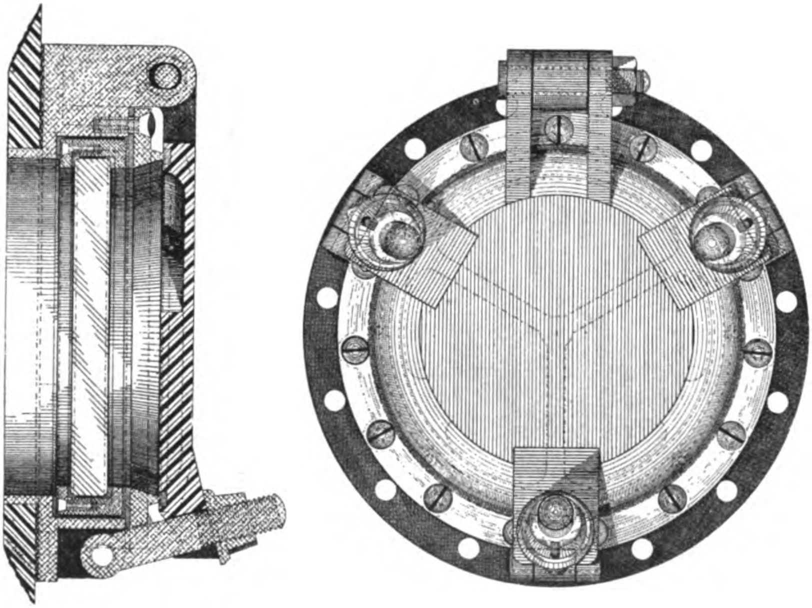
THE SPERRY GYRO-PILOT.

The "clear view bridge screen" is another innovation which is rapidly finding favour for both naval and mercantile vessels. It consists of a glass disc 11 in. in diameter, made to rotate in its own plane by an electric motor and at such a speed that rain, spray, or snow is instantly thrown off. This apparatus must be a great boon to those responsible for navigation in heavy weather.

The use of oil fuel has also promoted the use of the Pneumercator measuring gear, which is supplied by Messrs. Kelvin, Bottomley & Baird. It enables the designer to dispense with sounding pipes, which would be very objectionable in passenger spaces, on account of fumes from the oil, and, as the indicators can all be concentrated in the machinery space, the engineer on watch can tell at any time the exact condition of the tanks.

The adoption of oil as fuel has raised a new problem regarding means for dealing with fire, as the use of water or the ordinary type of extinguishers may have the effect of spreading burning oil. This has been satisfactorily met by the introduction of appliances which will emit froth, consisting of minute bubbles filled with carbonic acid gas, which quickly covers the surface of burning liquids and smothers out the fire.

A British firm has recently introduced a new principle into this type of appliance, whereby the chemical constituents cannot possibly come into contact with each other during rough weather at sea. Such fire extinguishers should not discharge carbon-tetrachloride, as the gases generated are both objectionable and dangerous if they are used in confined spaces.



UTLEY'S PATENT UNDERWATER-LINE FIXED LIGHT.

## PASSENGER ACCOMMODATION AND CARGO.

The bulk of purely passenger vessels are now designed to carry passengers in compartments at the level of the waterline, but are so arranged that cargo can be carried in these spaces during the off season. The additional weight of cargo increases the draught and involves fitting a special type of underwater sidelight in the lowest 'tween decks. Messrs. Utley, of Liverpool, have specialized in this item of equipment and have produced a light which, it is understood, will be accepted by the Board of Trade as suitable for submerging 3 ft. below the waterline. A section and elevation of this fitting are given on page 262.

Two years ago a special committee was formed to investigate the possibilities of standardizing many of the minor items of equipment which are common to all classes of vessels, such as bollards, fairleads, derrick smithwork, blocks, valves, etc. On account of the large field to be covered, the committee has not yet completed its report, but no doubt their efforts will lead to unification of practice for a number of fittings, which should help to reduce the cost of production and also ensure more rapid delivery in cases of emergency.

J. ANDERSON.

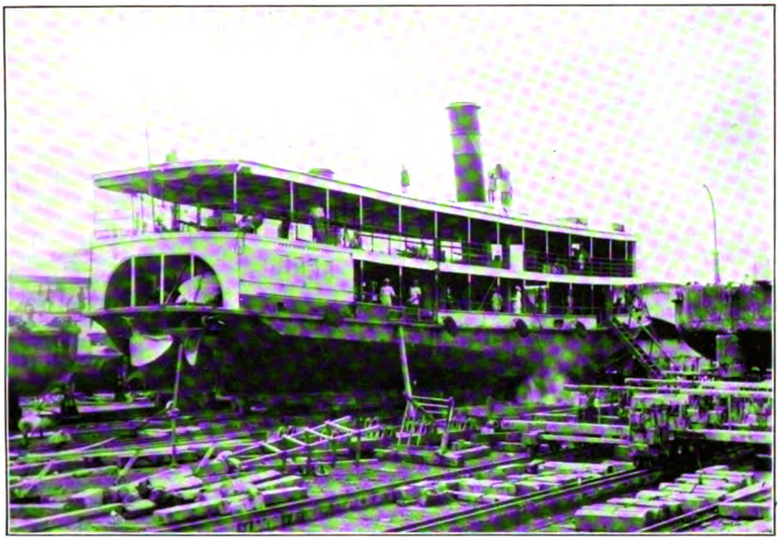
# CHAPTER X.

## SHALLOW-DRAUGHT VESSELS FOR INLAND NAVIGATION.

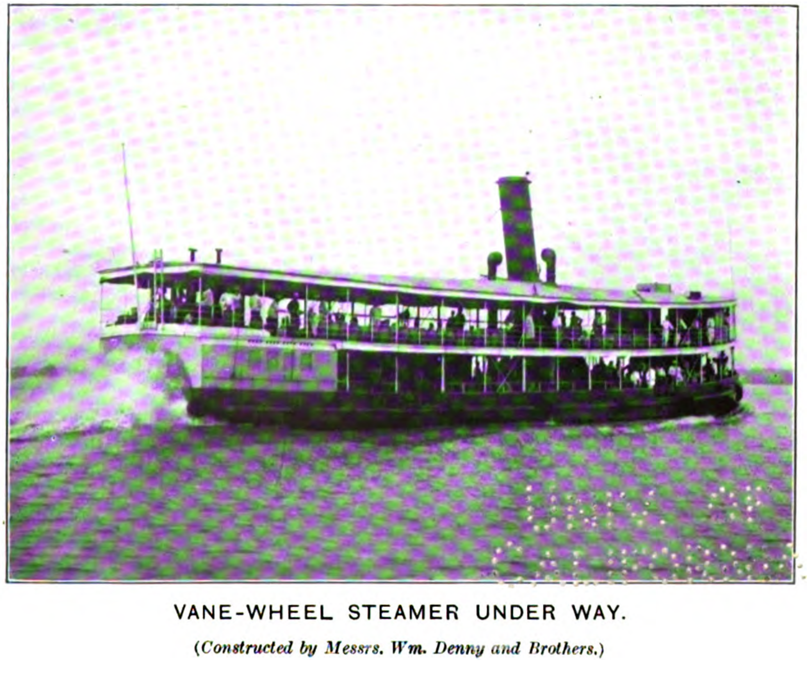
IN the early stages of the development of many of the tropical and sub-tropical countries of the world, the only practicable means of transporting supplies to plantations, mines, and settlements in the interior, and of bringing back their products to the coast for shipment, are provided by the great natural waterways which often drain a vast area of land. Such waterways frequently traverse country so covered with dense vegetation as to be more or less impassable by transport animals or carriers on foot, but even in fairly open country the development of the resources of the hinterland is generally dependent, at first, upon the existence of a river on which some form of navigation is possible.

The design and construction of craft for the navigation of such uncontrolled rivers, of which the flow may vary widely as the seasons change, and which usually include in their courses numerous rapids and shoals, have provided the naval architect with many difficult but interesting problems. When loads of, say, a hundred tons are required to be carried on a draught of a foot or two, the construction of a hull with the necessary strength and durability and the provision of propelling machinery having sufficient power to enable the vessel to proceed through rapids, are by no means simple matters. The difficulties are further augmented by the fact that such vessels have to be constructed in civilized countries far from those in which they are required for service. They have, therefore, frequently to be designed for shipment in parts and arranged for re-erection by unskilled labour in localities where none of the facilities of a modern shipyard or engineering works exist. The fact that the class of vessel referred to has generally to be operated by native labour has also to be taken into consideration in the design, particularly in connection with the propelling machinery.

Although finality has by no means yet been reached, practical solutions to all the various problems involved have been found, and in finding them, it is satisfactory to note, British naval architects, shipbuilders, and marine engineers have certainly played the leading part. In view of this, and also because shallow-draught vessels are of considerable importance to the development, not only of our own Dominions overseas, but also of many foreign countries in which British interests are concerned, a brief review of recent practice in this class of shipbuilding work may be of some interest.



VANE-WHEEL STEAMER ERECTED ON SLIPWAY.



VANE-WHEEL STEAMER UNDER WAY.

*(Constructed by Messrs. Wm. Denny and Brothers.)*

### Considerations in Hull Design.

Although the limitations in the matter of draught, and consequently of weight, greatly increase the difficulty of designing a hull to meet the requirements of strength, there is less room for the display of originality in the solution of this part of the problem than is the case with regard to the machinery. In designing the hull, careful attention must, of course, be paid to the distribution of the loads, and even greater care must be exercised in the utilization of the material to the best possible advantage than is necessary in ordinary shipbuilding work. It is probable that the modern high-tensile steels will be employed to an increasing extent in the future, at all events for the more highly-stressed portions of the hull structure of shallow-draught vessels, since the greater first cost would doubtless be more than compensated for by the increased cargo-carrying capacity, and consequently augmented earning power, of the vessel resulting from the reduced weight of the hull. This question, however, is largely an economic one, to be decided by the owner in consultation with the naval architect and builder.

In any case, a combined effort should be made by all concerned to see that only those fittings, auxiliaries, stores, spares, etc., that are really essential to the efficient working of the vessel are supplied during construction or added in service. The weight of unnecessary material carried of the class referred to may easily amount to several tons—an item of considerable importance in a vessel of limited draught.

### Systems of Propulsion.

It is, however, in connection with the propelling machinery that the greatest diversity exists in current practice. The choice of the particular type of machinery to be used in each case depends mainly upon the conditions to be complied with, both as regards service requirements and with respect to the nature and cost of the fuel available. It may also be affected, to some extent, by the previous experience of the builder or owner.

It is proposed to describe in this chapter a few examples of shallow-draught vessels for river navigation which have been constructed by British shipbuilding firms, in order to illustrate the present state of development of this class of craft; but, before doing so, it may be useful to summarize some of the considerations underlying the selection of the type of propelling machinery, having particular regard to its propulsive efficiency.

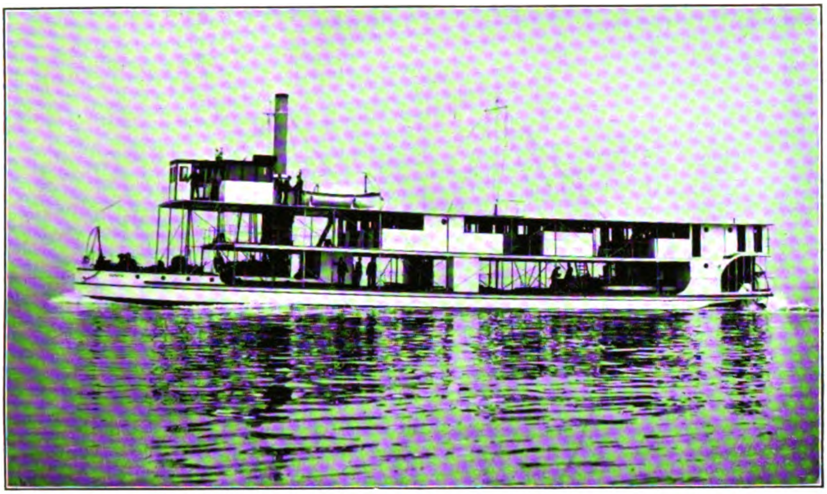
### Stern-Wheel and Side-Paddle Propulsion.

In general, it would appear that where a large deck area is required for a passenger or cargo vessel of moderate speed, the conditions can most easily be met with a stern-wheeler. For use in tropical countries especially, this class of vessel has the advantage that the accommodation is more open to the breeze than is the case with other types. As regards propulsive efficiency, there is but little to choose between the stern-wheeler and the side-paddle steamer, although the latter may be slightly superior under the most favourable conditions. When adequate immersed area of float in relation to speed and power, and a suitable ratio of wheel diameter to depth of immersion, are provided in a side-paddle steamer (especially when the paddles are fitted with steel floats), a higher propulsive efficiency is obtainable than would be possible with a completely immersed screw propeller, which would need to be of small diameter on account of the limited draught. Propulsive efficiencies of the order of 55 per cent. (this figure representing the ratio of effective horse-power to indicated horse-power expressed as a percentage) are possible with side-paddles, but the figure mentioned is considerably reduced by insufficient float area or unfavourable immersion. Any material alteration in the draught of a side-paddle steamer, due to unavoidable changes in the loading on service, will cause a large variation in the propulsive efficiency, so that, in the light condition, the employment of water ballast may be advantageous. The adjustment of the depth of immersion of the wheels to give the highest efficiency at a selected draught is best arrived at from the results of model experiments in a tank, measurements being made of the height of the water surface relative to the hull when the model is being run at full speed. This, it is understood, is the regular practice of Messrs. Wm. Denny and Brothers, of Dumbarton. Messrs. Yarrow, of Glasgow, it may be mentioned, have also made considerable use of the experimental tank in connection with the design of shallow-draught vessels, and they attribute the success of many of their boats of this type to the preliminary investigations carried out with models.

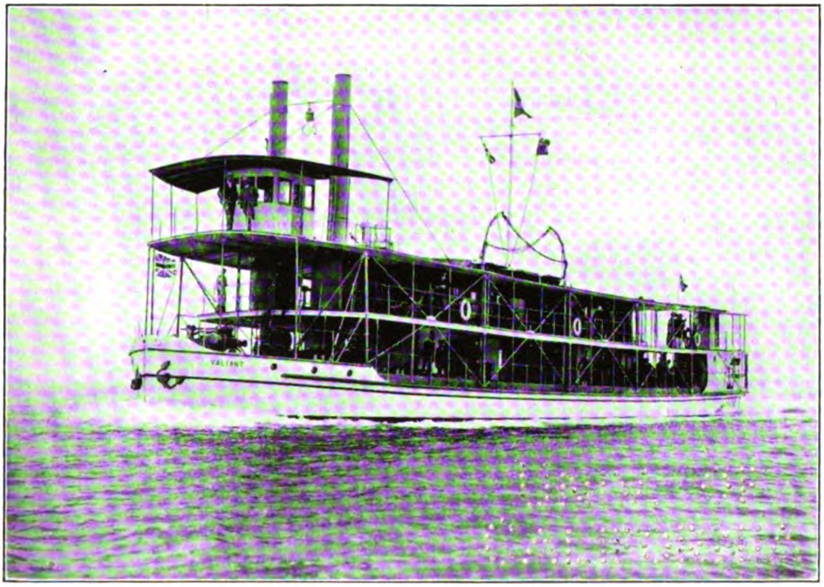
The above remarks as to side paddles are equally applicable to stern-paddle wheels, except that the detrimental effect on propulsive efficiency of variations in the load may be obviated, to some extent, with stern-paddle wheels, by adjusting the fore and aft trim so as to keep the depth of immersion of the wheel as nearly as possible constant. With a properly designed wheel working under favourable conditions, a propulsive efficiency of about 52 per cent. may be expected from a stern-wheeler.

## SCREW PROPELLERS IN TUNNELS.

When the draught of a vessel is so light as to render it impossible to obtain a satisfactory efficiency from screws which are small enough to be completely immersed when the vessel is at rest, a tunnel is sometimes formed in the after portion of the hull and the propeller is located in this. With this arrangement, the diameter of the propeller exceeds the draught and the upper part is above the water-line, but when the vessel is running at full speed the water rises and completely fills the tunnel so that the propeller is then wholly immersed. The gain in propulsive efficiency, due to the larger diameter of the screw, is offset, to some extent, by the loss associated with the flow of water through the tunnel, so that the net propulsive



STERN-WHEEL STEAMER SAROTA FOR NORTHERN NIGERIA.



STERN-WHEEL STEAMER VALIANT FOR SOUTHERN NIGERIA.
*(Constructed by Messrs. J. Samuel White & Co., Ltd.)*

efficiency of this device is probably lower than is obtainable with side paddles or stern-paddle wheels working under favourable conditions.

## THE YARROW HINGED FLAP.

Probably the most important improvement in this system of propulsion, and that which has rendered it particularly suitable for use when high speeds are required on a light draught, was the introduction of the hinged flap by Sir Alfred Yarrow, the arrangement being first described by him in a paper read before the Institution of Naval Architects in April, 1903. The essential feature of the Yarrow flap is that the seal at the after end of the tunnel, which is necessary when starting to enable the tunnel to fill completely with water, can be dispensed with when the vessel is under way, the velocity of water past the end of the tunnel then being sufficient to prevent the ingress of air and to maintain the complete immersion of the screw. Sir Alfred therefore fitted a steel flap to the after end of the tunnel, the flap being hinged at its forward end to the top of the tunnel and arranged so that its after edge can be let down to the water-line when the vessel is at rest. When the vessel is under way, the after end of the flap is raised, either by hand or automatically, in order to reduce the resistance to the flow of water through the tunnel, and by this means the propulsive efficiency is increased by fully 10 per cent. in comparison with a screw propeller working in a tunnel without a flap.

## THE VANE-WHEEL SYSTEM OF PROPULSION.

The latest device to be introduced for use in connection with the propulsion of shallow-draught vessels is the vane-wheel system, due to Messrs. Wm. Denny and Brothers. In this system, twin vane wheels are fitted in the most favourable position abaft the hull and arranged so that the vanes are only partially immersed in the wave which is formed under the wheels when the vessel is travelling at full speed. The height of the wave in which the vane wheels work and the most suitable dimensions for, and position of, the wheels have been determined from models in the firm's experimental tank.

Very high propulsive efficiencies were obtained from the model experiments with vane wheels, and these results were subsequently confirmed by trials carried out on the Clyde with an experimental vessel 100 feet in length. This vessel was originally fitted with twin screws, and afterwards with vane wheels, so that an accurate comparison of the two systems of propulsion could be made. The trials, it is understood, demonstrated the superior propulsive efficiency and manœuvring qualities of the vane-wheel system in a most conclusive manner.

Messrs. Denny have since constructed another vane-wheel vessel for service in India. This vessel has a length of 115 feet, with a beam of 25 feet, and a depth of 7 feet 6 inches, while the draught, under average service conditions, will be from 4 feet 6 inches to

5 feet. The general arrangement of the vessel and her machinery can be followed from the profile reproduced on the opposite page. Views of the vessel after re-erection on a slipway in India and also under way in Eastern waters are given on the Plate facing page 264. Preliminary speed and power trials have been carried out, and although the complete results of these trials are not yet available, it is understood that a saving of fuel of about 20 per cent. has been effected in comparison with numerous twin-screw vessels of similar dimensions working under the same conditions.

An important practical advantage which both vane wheels and paddle wheels have over completely-immersed screw propellers, is the immunity from rapid wear of bearings caused by sand and other solid matter held in suspension in shoal water. Another point in favour of the former is the fact that alterations and repairs can be carried out without the necessity for dry docking the vessel.

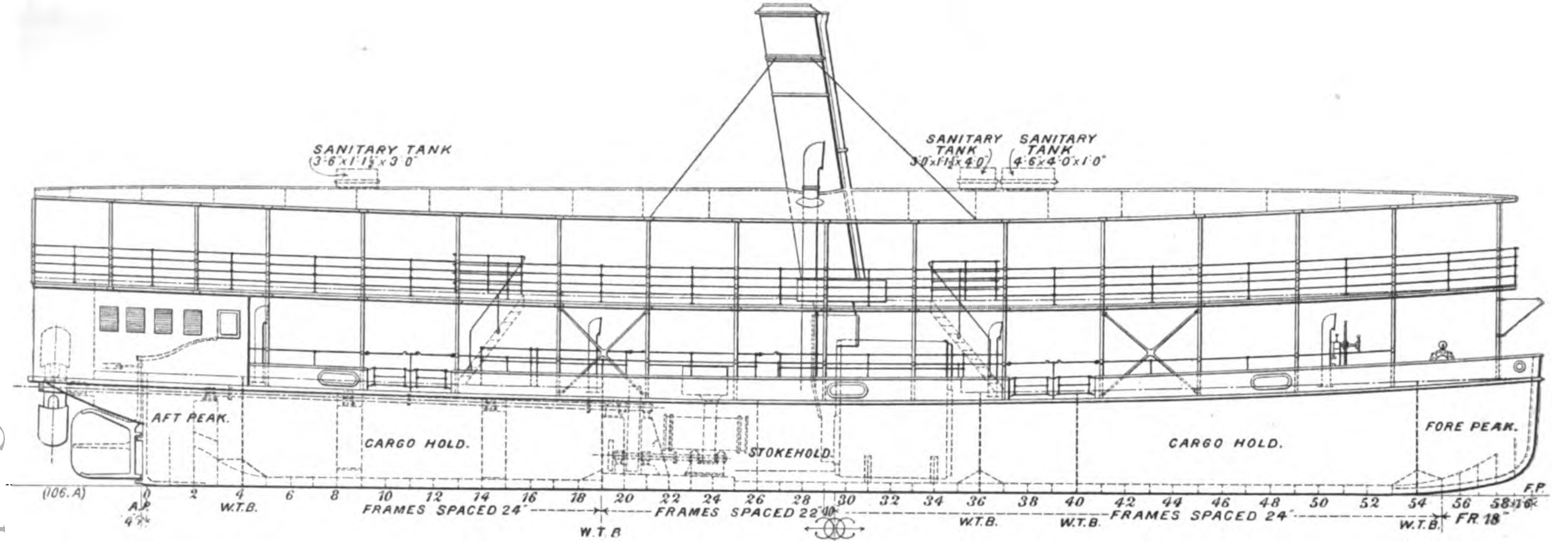
## AIRSCREWS FOR MARINE PROPULSION.

In some rare and very special circumstances, airscrews have been applied to the propulsion of shallow-draught vessels, but their use in this connection is hardly likely to extend. Only very low propulsive efficiencies are possible with airscrews of practicable dimensions, owing mainly to the relatively low speed of advance of the vessel. When the speed of advance is high, as in the case of an aeroplane, satisfactory propulsive efficiencies can be obtained with airscrews of comparatively small disc area in relation to the thrust developed, because, in these circumstances, the airscrew acts on a large mass of air per unit of time. For the propulsion of almost any useful form of ship, however, it is not practicable to employ an airscrew of sufficient diameter in relation to the thrust and speed of advance to obtain a reasonably high propulsive efficiency.

In general, somewhat similar objections apply to the use of hydraulic propulsion employing some form of centrifugal pump to draw in the water and afterwards discharge it. The propulsive efficiencies obtainable by this method are lower than are given by the more usual systems already referred to, owing to the relatively small sectional area of water that is operated upon. Some of the newer systems of hydraulic propulsion, however, have been applied with useful results under certain special conditions.

## ENGINES AND BOILERS.

The decisions as to the type of boilers to employ with steam-driven vessels, and as to the use of internal-combustion engines, are so largely governed by the nature of the fuel supply, the class of labour available, and other purely local conditions, that the circumstances leading to them cannot be briefly discussed in a general manner. Water-tube boilers, of course, have the advantage of less weight for a given steaming capacity than boilers of the return-tube or locomotive type, and would generally be used for a high-speed vessel of very light draught. If circumstances render it desirable,



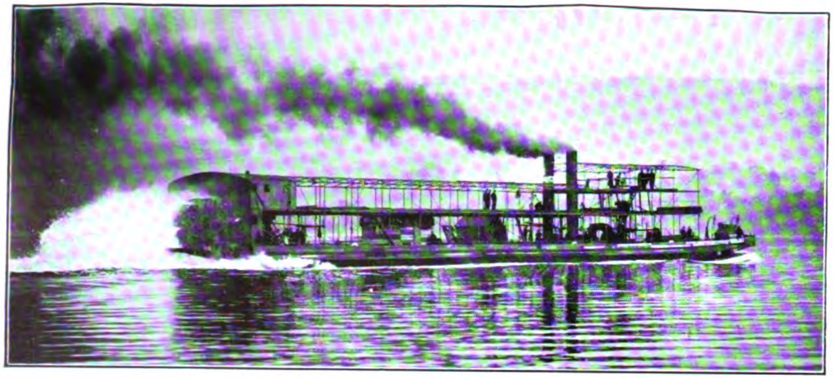
**Vane-Wheel Shallow-Draught Steamer for Service in India.**
*(Messrs. Wm. Denny & Brothers, Dumbarton.)*

oil or petrol engines can be employed in screw-propelled vessels or with the vane-wheel system of propulsion, although they are not naturally adapted for driving stern wheels or side paddles. Each case must, of course, be considered on its merits, and it is perhaps hardly necessary to point out that, in those cases where fuel is available at an almost negligible cost, thermal efficiency in the propelling machinery may well be sacrificed to simplicity and reliability in operation. For example, when wood can be obtained for use as fuel for the mere cost of cutting by native labour, a simple non-condensing engine having a comparatively low efficiency can be employed in place of a more efficient compound engine with a surface condenser and its various auxiliaries, provided that the feed water is also satisfactory. The saving in first cost and in weight of machinery carried will probably more than counterbalance the increased fuel consumption.

### STERN-WHEEL STEAMERS.

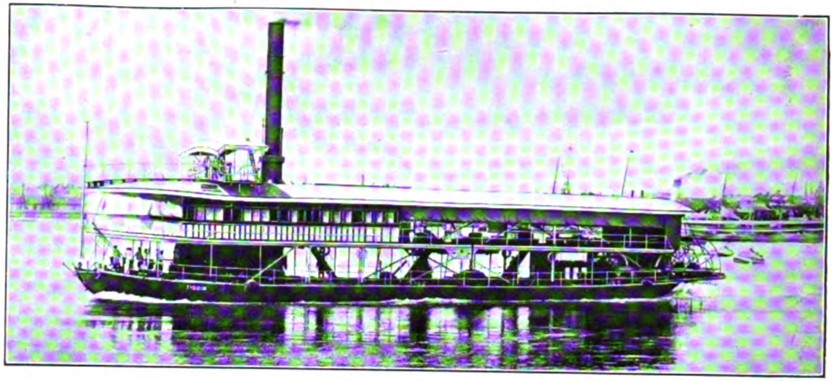
As the earliest shallow-draught vessels were of the stern-wheel type, it will be logical to describe some examples of this class of vessel first, dealing with the remaining types roughly in order of their development. A stern-wheeler recently constructed by Messrs. Wm. Denny and Brothers is illustrated on the Plate facing this page, and is an excellent example of this firm's productions, which, of course, also include side-paddle and screw-propelled vessels. The vessel illustrated has a length of 190 feet, a breadth of 32 feet, and a draught of 4 feet, at which the displacement is 600 tons. She is propelled by steam engines developing 465 indicated horse-power and attained a speed of 11·63 miles per hour on trial.

The two stern-wheelers illustrated on the Plate facing page 266, named Sarota and Valiant, were constructed some years ago by Messrs. J. Samuel White & Co., Ltd., of East Cowes, for service in Northern and Southern Nigeria, respectively. In general, the vessels were of similar design, but the Valiant was the larger of the two, and was fitted with two water-tube boilers of the White-Forster type instead of a single cylindrical boiler as was installed in the Sarota. Both vessels were propelled by triple-expansion, surface-condensing engines having a stern-paddle wheel on each end of the crankshaft within the width of the vessel, and in both cases clutches were fitted so that either of the paddle wheels could be disconnected at will and the full engine power applied to the other. The Sarota, which was 135 feet in length, 25 feet 6 inches in breadth, and 5 feet in depth, carried a load of 30 tons on a draught of 2 feet, while the Valiant, which was 10 feet longer, 1 foot 6 inches wider, and 6 inches deeper, carried 40 tons on the same draught; both vessels had the same speed of 10 miles per hour. These two vessels, and a large number of others of all types, were designed by the late Sir Edward J. Reed, who for many years acted as naval architect and engineer to the Crown Agents for the Colonies. Full particulars of several interesting examples of his work will be found in a paper, of which he was the author, read before the Institution of Naval Architects in April, 1906.



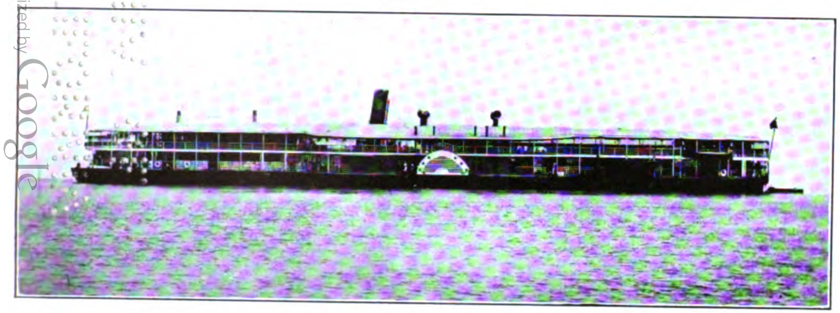
MODERN STERN-WHEEL STEAMER.

*(Messrs. Wm. Denny and Brothers.)*



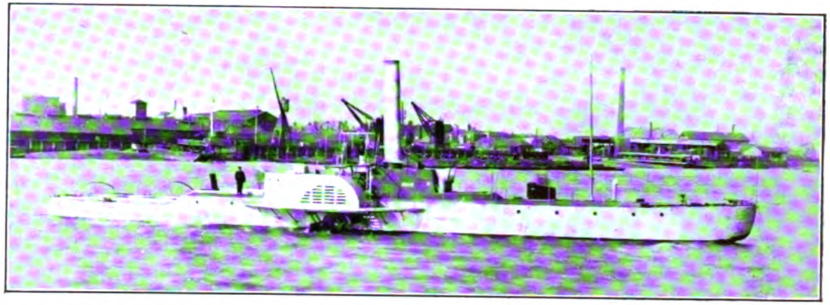
TYPICAL STERN-WHEEL STEAMER.

*(Messrs. Yarrow & Co. (1922), Ltd.)*



SIDE-PADDLE STEAMER OF 1325, TONS DISPLACEMENT.

*(Messrs. Wm. Denny & Brothers.)*



SIDE-PADDLE STEAMER BARON HORACE GUNZBURG.

*(Messrs. J. I. Thornycroft & Co. Ltd.)*

Messrs. Yarrow & Co., (1922) Ltd., Scotstoun, Glasgow, have had a particularly extensive experience in the design and construction of stern-wheelers and a full account of the products of their yard, originally located on the Thames at Poplar, would be of considerable historical interest. It is not, however, the writer's intention to deal with the subject from the historical standpoint, but, as already stated, to describe some representative examples of recent practice. One of the vessels of which a photograph is reproduced on the Plate facing page 270 is such an example, Messrs. Yarrow having constructed a considerable number of stern-wheelers of similar design to that illustrated over a period of several years. Some vessels of this class, it may be mentioned, were towed across the Indian Ocean from Rangoon to Basra at the head of the Persian Gulf during the late war, with their machinery in position. This point is of some interest in view of the fact that their draught, when carrying a load of 110 tons, is only 3 feet. The other main dimensions were: length 130 feet and beam 31 feet. The light draught attained in these vessels with the load mentioned obviously calls for the use of the highest class of material in conjunction with careful design to render the structure uniformly elastic throughout its length.

## SIDE-PADDLE STEAMERS.

Side-paddle boats, although frequently employed for excursion traffic in shallow coastal waters, are less commonly constructed for navigating the shoal waters of tropical rivers than are vessels of the stern-wheel type. The example illustrated on the Plate facing page 270, however, is interesting on account of its light draught in comparison with its length. This vessel, which was built by Messrs. Denny and Brothers, having a length of 310 feet and a breadth of 46 feet, draws only 4·44 feet of water with a displacement of 1325 tons. Her speed is 15½ miles per hour, with 2,200 indicated horse-power.

Another side-paddle steamer, illustrated on the Plate facing page 270, was built by Messrs. John I. Thornycroft & Co., Ltd., at Southampton, for use on the River Lena. She is named Baron Horace Gunzburg, and is interesting for the high power employed, viz. 538 indicated horse-power, on the very restricted draught of 15½ inches; this is thought to be a record for a side-paddle boat. The vessel is 140 feet in length, 25 feet in breadth, and 7 feet in depth, while her engines, developing the power mentioned, give her a speed of 12½ knots; steam is supplied by water-tube boilers.

## SCREW-PROPELLED VESSELS.

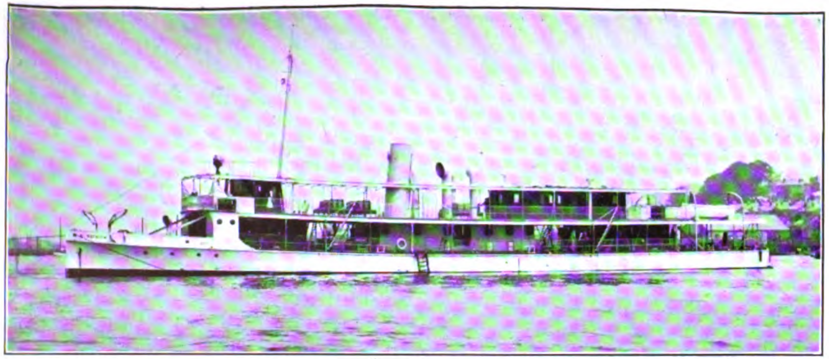
When high speeds are required in shallow-draught vessels screw propellers working in tunnels and driven by steam engines supplied with steam from water-tube boilers, appear to be the most suitable form of machinery. The St. Patrick, illustrated on the Plate facing page 272, and constructed by Messrs. Thornycroft for service in the

West Indies, is an example of a vessel of this class, and is also noteworthy by reason of her particularly attractive appearance. She is propelled by twin screws working in tunnels and attained a speed of 14·4 knots on trial when carrying a load of 60 tons on a draught of 3 feet, her engines then developing 1,224 indicated horse-power. The main dimensions of the St. Patrick are: length 180 feet, breadth 27 feet, and depth 7 feet. Another point of interest in connection with this vessel was that she made the voyage from Southampton to her destination in the West Indies under her own steam, the hull and superstructure being fitted for the purpose with special stiffening which was removed on arrival. The builders were thus enabled to carry out trials before delivery, so as to obtain an accurate record of the vessel's performance. When, as is frequently the case, shallow-draught vessels are constructed in parts and delivered by cargo steamer, no builder's trial is made, and reliable data as to speed, power, and fuel consumption are difficult to obtain.

## Vessels for Navigating the Yangtse-Kiang Rapids.

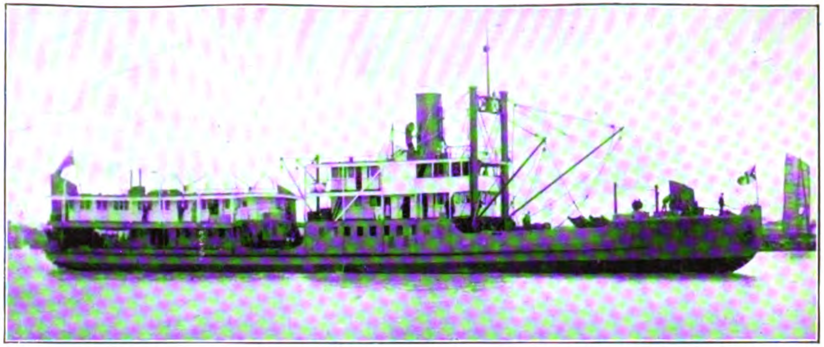
The Yangtse Kiang, in China, is a river on which the use of shallow-draught vessels is of particular importance for the transport of passengers and goods. Navigation, in this case, is rendered exceptionally difficult by the existence of rapids, the most dangerous of which occur between Ichang and Chungking. The total fall between these two places amounts to 476 feet, which is equal to about 16 inches per mile, and the current in this locality attains a velocity ranging from 8 to 14 knots. The first commercial vessel to ply unaided through these rapids was the Shu-Tung, which was built by Messrs. Thornycroft, and is illustrated on the Plate facing this page, as an example of a vessel propelled by twin screws working in a tunnel. The Shu-Tung made her initial voyage as far back as October, 1909, and has been in constant service since that time plying regularly through the rapids. The main dimensions of this interesting vessel are: length 115 feet, breadth 15 feet, and depth 6 feet 6 inches, while her mean draught is 3 feet 4 inches. She is propelled by steam engines developing 525 indicated horse-power, and supplied with steam from water-tube boilers; with the power mentioned the speed is 13 knots.

A considerable number of shallow-draught boats for service on the Yangtse Kiang under the difficult conditions above referred to have also been built by Messrs. Yarrow, and an example of one of their most recent designs is illustrated on the opposite Plate. This vessel, named the Wanhsien, has an overall length of 210 feet, a beam of 33 feet, and a depth of 10 feet 6 inches, while her draught with a load of 725 tons is 8 feet. She is propelled by two sets of triple-expansion engines, supplied with steam from two Yarrow oil-fired, water-tube boilers and driving twin screws in tunnels fitted with the Yarrow automatic hinged-flap device. On trial, the Wanhsien attained a speed of 14½ knots, carrying a deadweight load of 400 tons, the draught with this loading being 6 feet.



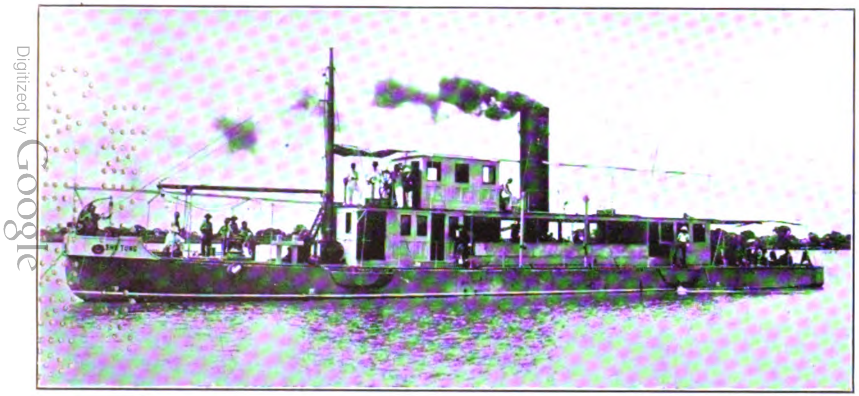
SHALLOW-DRAUGHT STEAMER ST. PATRICK FOR WEST INDIES.

(*Messrs. J. I. Thornycroft & Co., Ltd.*)



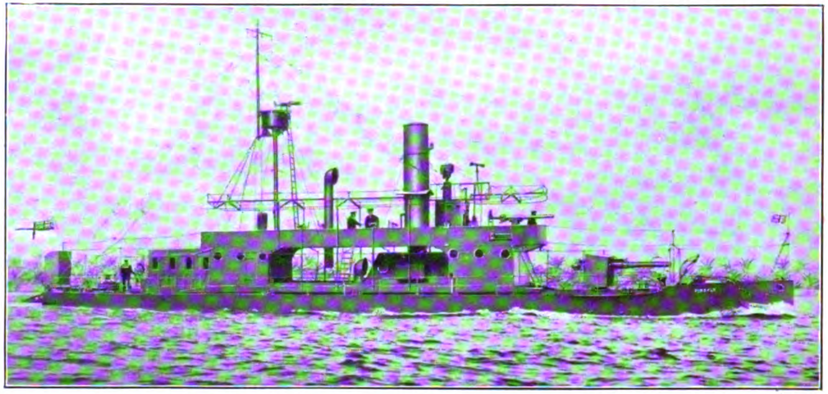
SHALLOW-DRAUGHT STEAMER WANHSIEN FOR THE YANGTSE KIANG.

(*Messrs. Yarrow & Co.* (1922), *Ltd.*)



SHALLOW-DRAUGHT STEAMER SHU TUNG FOR THE YANGTSE KIANG.

(*Messrs. J. I. Thornycroft & Co., Ltd.*)



SHALLOW-DRAUGHT TIGRIS GUNBOAT FIREFLY.

(*Messrs. Yarrow & Co.* (1922), *Ltd.*)

## SHALLOW-DRAUGHT GUNBOATS.

In addition to the transport of passengers and cargo, shallow-draught vessels have been largely employed in many of the semi-civilized countries of the world for the maintenance of law and order under peace conditions, as well as for conducting military operations in warfare. The part played by these vessels in the late war in connection with the British Army campaign against the Turks in Mesopotamia will be fresh in the minds of all, so that it is unnecessary to recount it here. A brief reference to one type of vessel used in this campaign may, however, be permitted as an example of the tunnel-propeller system applied to a vessel for military purposes. An illustration on the Plate facing page 272 is representative of the small Tigris gunboats designed by Messrs. Yarrow to the personal order of Lord Fisher given in 1915. Sixteen of these gunboats were constructed and erected on the Tigris in record time, afterwards taking part in the expedition to Baghdad, in which they proved particularly useful. They were 120 feet in length, of 20 feet beam, and had a mean draught of 2 feet 3 inches, while the armament provided included one 4-inch gun, one 12-pdr., and one anti-aircraft gun, in addition to five Maxims. The speed of the vessels was 11 miles per hour, and the Yarrow automatic hinged-flap system of propulsion was employed.

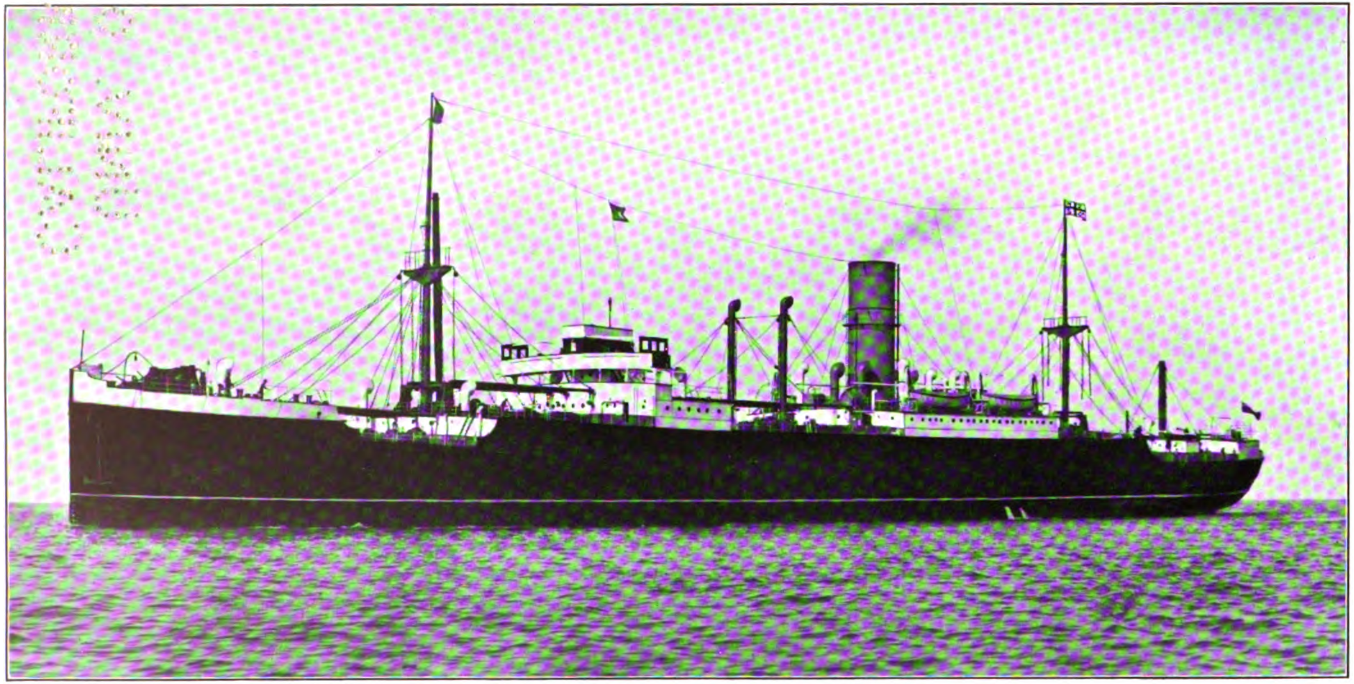
## SHALLOW-DRAUGHT VESSELS FOR TOWING.

There are, of course, numerous other more or less specialized applications for shallow-draught vessels, such, for example, as tourist and missionary services, hospital work, pioneering, exploration, etc., but as the design of craft for such purposes is mainly a matter of the arrangement of the accommodation, it is not proposed to deal with them in the present chapter. A brief reference may, however, be made, in conclusion, to the use of shallow-draught vessels for towing work, this being a special application of considerable economic importance. When using a power-driven vessel for towing barges it is necessary to adjust the size of the propeller or paddles to give a high propulsive efficiency at the towing speed. This is considerably lower than the free speed of the vessel, while the thrust required will be greater, so that the area of water acted upon should therefore be correspondingly increased if this can possibly be arranged for. The tunnel-propeller system with the hinged flap referred to above has been applied to towing work with satisfactory results as regards propulsive efficiency, and has also been found to have little or no damaging effect upon the banks of narrow waterways such as has been experienced with other methods of propulsion. Probably the vane-wheel system would be found to be well suited for towing work, but it does not appear so far to have been employed for the purpose.

One final point to which attention may be drawn relates to the form to be adopted for barges when these are to be towed on shallow waters. Although such barges, more often than not, are built with ship-shaped lines, it would frequently be advantageous to employ straight-lined forms, such forms being simpler and cheaper to construct—especially in semi-civilized countries. Tank experiments carried out by Messrs. Wm. Denny and Brothers, indicate that the straight-lined form giving the best results is one having cut-up ends. The angle of the end portions, however, has a considerable effect upon the resistance and must be carefully selected in order to reduce the work of towing to a minimum.

CHARLES COOPER.

UNIV. OF
CALIFORNIA



S.S. TURAKINA FOR THE NEW ZEALAND SHIPPING CO., LTD.

*(Constructed by Messrs. W. Hamilton & Co., Ltd.)*

# CHAPTER XI.

## PRACTICAL RESULTS OF DIRECTION FINDING BY WIRELESS.

FREQUENT casualties, bringing fine and well found steamers to their end, make it self-evident that further aids are urgently required by those responsible for safe navigation in these competitive days of high speed. It is therefore not unnatural that the idea of the development of a wireless receiver, which could indicate the direction from which wireless waves come as a supplement to the human eye and its power to indicate the direction from which light waves come, has made a strong appeal to the best type of British shipowner in his efforts to secure safety for life and property at sea. That the British shipowner is not behind foreign rivals in this respect is indicated by the fact that early in 1924, about 150 British merchant vessels were fitted, or were about to be fitted, with direction finding apparatus as compared with approximately 50 vessels fitted by any single foreign Nation.

### THE EARLY DIRECTION FINDING.

The earliest application of direction finding, of which practical use was made, consisted of shore direction finding stations which, when requested by a ship, took bearings of the ship's wireless signal and transmitted by ordinary wireless the resultant readings or position. This method was open to many objections. The number of independent people concerned in obtaining the result—and in communicating the result—offering the opportunity for personal error by any one of the several people. The strongest objection, however, lay in the fact that increasing reliance on wireless, in such circumstances, must lead to serious delay in the handling of traffic in any crowded sea route, particularly in view of the fact that in foggy weather each vessel must require additional bearings from time to time as a safeguard.

As an example of the difficulties of dealing with a large number of ships by this method, it may be mentioned that some little time ago the s.s. Alaska was lost on the American coast through stranding. She had been asking for a wireless bearing for nearly two hours, but her turn came too late.

Nevertheless these shore direction finding stations have done a lot of valuable work and have helped to prove the reliability of wireless. A Canadian report states that, after five years' experience, amongst the keenest advocates of direction finding stations were to be found those who at the commencement were ready to condemn them.

### A SHIPMASTER'S WANT OF FAITH.

The same report, after citing several examples of successful help from the direction finding stations, gives the following example :—

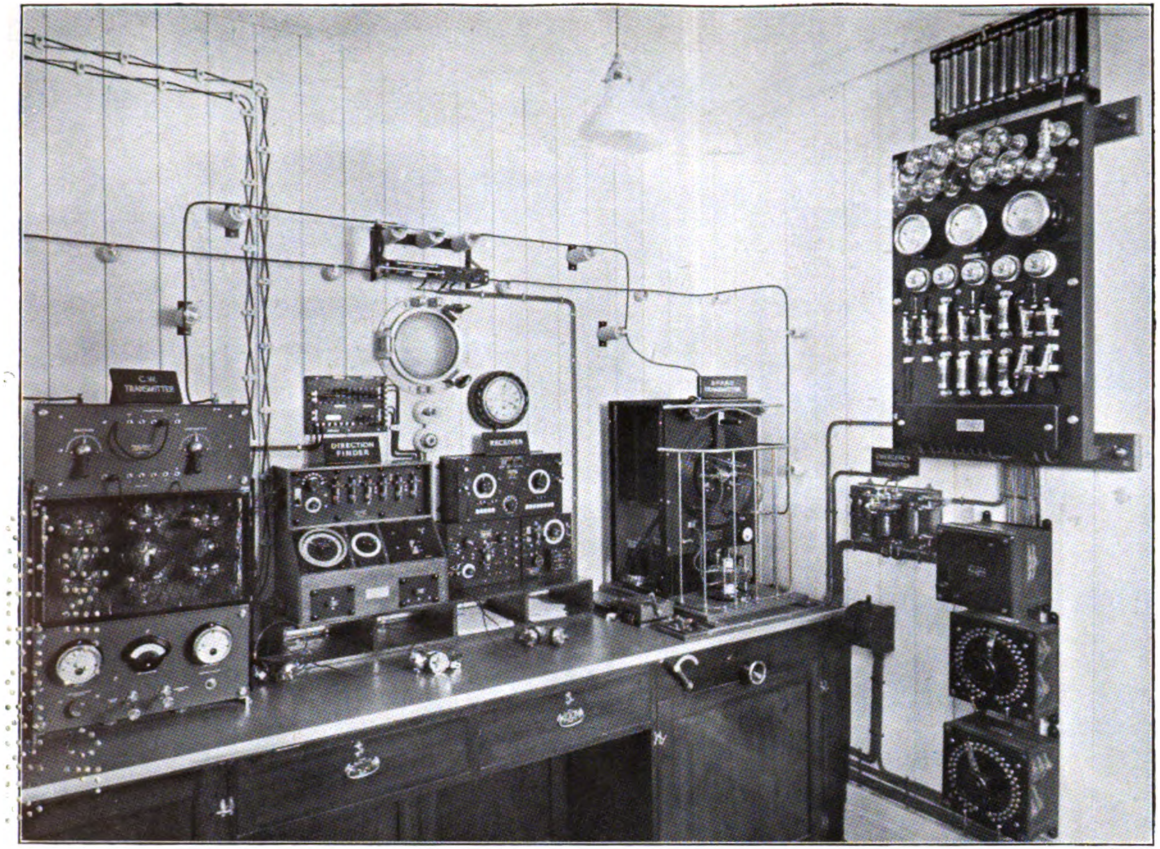
> An example of the disasters that might have been averted had the direction finding stations been more fully relied upon is the case of the passenger steamer s.s. Bohemian of 9,000 tons gross bound from Boston to Liverpool via Halifax, with 65 passengers and 115 crew. On March 1, 1920, at 2 a.m., this ship was approaching Halifax in foggy weather, and the Captain obtained a bearing from Chebucto Head direction finding station at the entrance to Halifax Harbour. The bearing thus obtained placed the ship between 5 and 6 miles nearer shore than the position as given by dead reckoning. The Master decided, however, that the direction finding bearing was entirely inaccurate and disregarded it, holding his ship to the same course for a further 40 minutes. At the end of that time, still navigating according to dead reckoning, he altered the course of his ship to turn into Halifax Harbour. Ten minutes later, just as Chebucto direction finding station was being called for another bearing the ship struck, and the request for a bearing was turned into a distress call. All the passengers were taken ashore safely, but six of the crew were lost subsequently whilst salvage operations were under way. The ship broke in two and was a total loss.

The same report concludes with a remark that eventually the most satisfactory method will prove to be that in which the direction finding apparatus is carried on board each vessel.

In proof of this belief, several beacon stations have recently been placed on the Canadian and American coasts to transmit wireless signals for the benefit of ships fitted with direction finders.

### DISASTER TO AMERICAN DESTROYERS.

A later experience of the United States Government will be remembered when a number of destroyers met with disaster. According to a writer in *Engineering* (see vol. cxvii., page 84), the two divisions were steaming to the southward from San Francisco towards the Santa Barbara Channel. In the afternoon, thick weather came on and several wireless bearings were asked for and given by shore direction finding stations. These bearings, whilst placing the destroyers fairly close to the dead reckoning position, in every case showed them to be nearer the land than they should have been. Unfortunately the commanding officer appears to have considered his dead reckoning position as the more reliable of the two. "At nine o'clock in the evening," it has been stated, "the commanding officer believed himself to be at the mouth of the Santa Barbara Channel, whereas he was almost under the cliffs of Arguello Point. So assured was he of the safety of his position that he did not wait to take in a further wireless direction signal and altered course to the eastward to turn into the channel; a few minutes later the ships went ashore." This regrettable incident appears to illustrate in a forcible manner the reluctance which any commanding officer may feel in accepting an outsider's calculations as to the position of his ship. The work of himself and his officers is intimately linked up



MARCONI TRANSMITTING, RECEIVING AND DIRECTION-FINDING APPARATUS IN SHIP'S WIRELESS ROOM.

with the fate of the ship and there is a feeling that in case of carelessness the blame will reach the guilty person, whereas the shore direction finding station is not only impersonal but cannot accept responsibility for errors.

This example will no doubt strengthen the decision of the United States Government (which had been made before this accident) to erect a series of wireless beacon stations for the service of ships' direction finders.

## NEW ZEALAND'S EXPERIENCE.

The New Zealand Government has also been carrying out experiments with direction finders, and the following extracts from an official statement by the Hon. G. J. Anderson, Minister of Marine, will be of interest :—

> The Marine Department with the assistance of the marine engineer, the chief telegraph engineer and Professor Marsden has carried out the practical experiments and tests with the Government steamer Tutanekai. . . . The tests have been so thoroughly satisfactory as to establish confidence in the minds of Captains Hooper, Bollons and Whiteford. Any person with ordinary hearing, and without knowledge of navigation or wireless telegraphy can perfectly understand and perceive its method of operation. The experiments proved that a direction finding instrument, with a shore wireless telegraph fog signal (beacon station) was one of the most valuable aids to navigation in fog or weather of low visibility, that is in existence at the present time.

## THE DIRECTION FINDER ON BOARD SHIP.

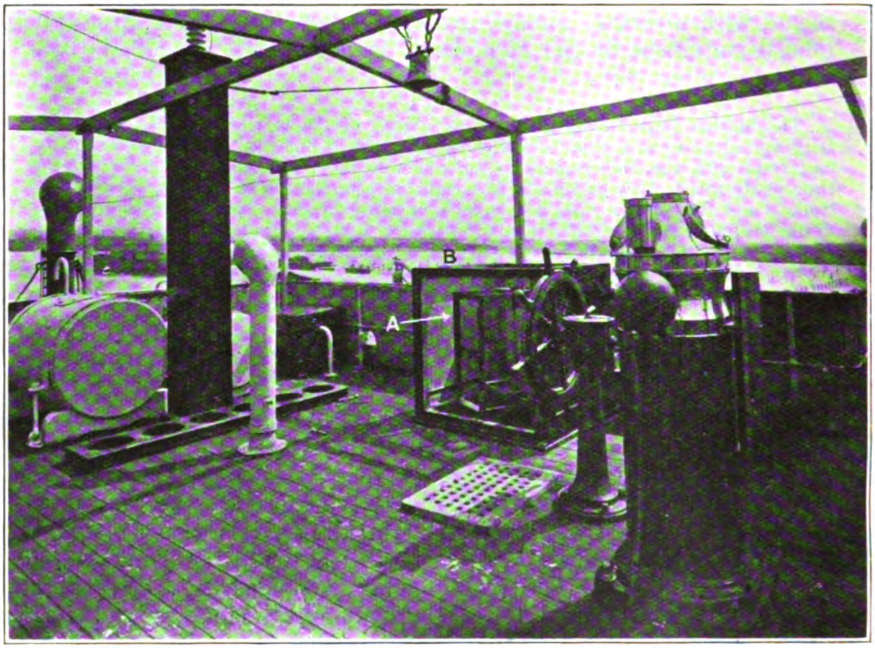
The direction finder on board the ship was largely improved during the course of the war, and very shortly afterwards a number of the most progressive shipowners were trying out its reliability. The ship's direction finder can be placed in the chart room or W/T cabin, where it takes its place as one of the navigation instruments of the ship. The navigator becomes well acquainted with it in fine weather and having tested it thoroughly is enabled to place greater trust in it when bad weather comes. Amongst the many advantages of this method, is the fact that bearings being taken of any wireless station when transmitting, there is no necessity to send additional messages from each ship to add to the mass of traffic already in the ether. There are no charges to be paid for each bearing and consequently nothing to hinder constant practice in its use. The instrument, in addition to its navigational uses, can be used to lead a rescuing vessel to a ship in distress.

The practice of using it to plot the approach of another vessel in a fog may very soon be added to its virtues. That this last method is quite feasible has already been proved by the record of a ship fitted with a direction finder whose captain was enabled to warn the captain of another vessel that he was steering a dangerous course with regard to the land, having discovered this from wireless bearings he had taken. On this occasion the second ship, a large liner, was not inclined to take the advice, but no doubt proceeded with greater caution. Later her captain must have had the mortification of discovering that the ship which gave him the warning had not only reached port before him by steering a direct course, but had beaten him by about thirty hours.

## THE TWO SYSTEMS.

The British Merchant Service at present uses one of the two following systems :—

(1) The Marconi Company's system, consisting briefly of two loop aerials fixed on special posts, or hung from the jumper stay, usually over the bridge, in such a manner as to avoid any movement from wind pressure, etc. The area covered by these loops is between 240 and 400 square feet. In the field created by these large aerials, a small search coil is revolved to determine the bearing, the bearing being actually found by bisecting the angle between the point at which the signal is lost to audibility and that at which it is again heard when rotating the search coil. The symmetry of the two aerials in this system must be carefully adjusted, and if for any reason the aerials have to be lowered at any time, they should be thoroughly tested and adjusted at the first opportunity after re-erection. This system has the special advantages of great ease of manipulation (due to the light weight of the moving parts) and the ease with which all the errors mentioned below can be compensated for in the apparatus itself.

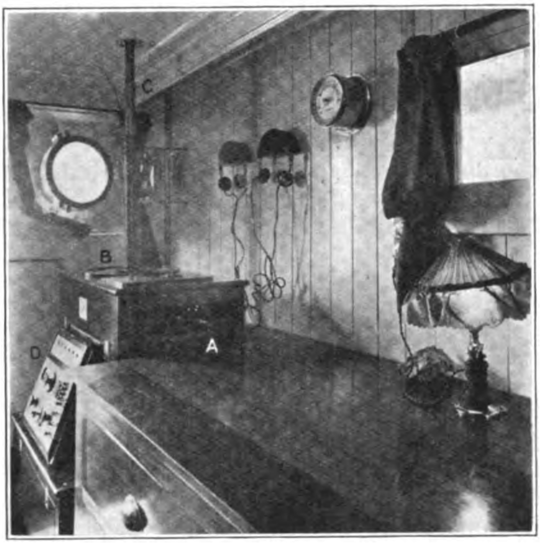


DIRECTION-FINDER AERIAL.

A. Rotating Frame carrying Aerial Coils. B. Watertight Case with Side removed.

The photograph reproduced on the Plate facing page 276 shows the neatness with which this apparatus can be installed in the wireless room of a ship.

(2) In the Radio Communication Company's system, two small rigid coils, fixed at right angles to each other, are rotated on a central pivot. The illustration on the opposite page shows this aerial system on the bridge of a steamer, the side of the watertight box being removed to show the coils, while the illustration on this page shows the receiving cabinet and dial in the chart room of the same vessel. The coil overhead is rotated on its centre pivot by a wheel at the right hand of the apparatus. The bearing is, in this method, determined by gently rocking a small lever backwards and forwards until the notes heard in the telephones are approximately equal in both positions of this lever, when the pointer on the dial indicates the bearing, thus giving a direct reading at the maximum signal strength. Owing to the rigid construction and small size of the coils, which form the aerial system, they are not liable to error through displacement.



Direction Finder in Chart Room.

A. Control Wheel for Rotating Coils.
B. Bearing Indicator Dial.
C. Rotating Spindle carrying Frame Aerial on Deck above.
D. Receiving Instruments.

## Wireless and Compass Deviation.

Regarding both systems, if the close relationship between magnetism and electricity is kept in mind, it will be easily appreciated that, in the same manner that the earth's magnetic force cannot cause the compass to give an absolutely accurate reading, but only one which differs from the ideal by an amount known as the deviation of the compass, so the structure of the ship will cause a slight quadrantal error in the wireless reading, which can easily be determined, and is fortunately a much more stable and constant error than that of the compass.

The extraordinary degree of reliance on wireless now felt by some shipmasters may be judged from a recent report which states that a wireless bearing was used in cloudy hazy weather to check the deviation of the compass—an illustration of the value of the newer instrument! Another shipmaster records a voyage from the United States home in cloudy weather in which no astronomical sights were possible. He gives the credit of an exceptionally fast passage, notwithstanding these conditions, to the confidence inspired by his direction finder.

In addition to many navigational achievements, there are numerous records of the use of the direction finder to locate the position of vessels in distress, and it is surprising to learn how far some of these vessels have been from the dead-reckoning position given with the distress signal. Cases are on record which show between fifty and seventy miles error in position, these large errors being usually in mid-Atlantic after some days of bad and cloudy weather.

## The Importance of Constant Practice.

A record is in existence of a ship, homeward bound from Canada in foggy weather, being set in towards the coast of Newfoundland, to such an extent that a wireless bearing proved Cape Race to be on the starboard bow instead of to port. Course having been immediately altered at right angles to the original one, further bearings were taken at intervals, and when Cape Race was once more on a safe bearing, course was set to pass eight miles from it. A sounding was taken when the wireless bearing showed Cape Race to be abeam and this proved that notwithstanding the fog the ship was exactly eight miles from the point.

Wireless bearings, from certain stations, may be found a little in error in a particular direction. This error occurs when the wireless wave in its transit towards the ship has travelled parallel to or nearly parallel to the coast line near the transmitting station. The navigator in laying off the bearing on the chart will easily notice if this is the case and will thus be warned. This is, of course, an additional reason for practice in direction finding in fine weather, as by this means the navigator can record on the chart any position in which these errors are found, and consequently be prepared for them. A considerable amount of valuable data in this connection has already been compiled by Commander Slee, R.N. (retired), which shows, in the case of many important wireless stations, the arcs through which reliable bearings can be obtained.

### FURTHER RESEARCH DESIRABLE.

It appears now that direction finding is so far established as a normal method of navigation, that it is time that some Government Department should undertake a regular survey on the reliable bearing arc of all wireless stations likely to be used for navigation throughout the world. It would appear as though the simplest method of achieving this object would be to add this to the duties of the survey vessels under the Hydrographic Department of the Admiralty, and in view of their constant work in revising surveys and soundings throughout the world, it would not be long before a large amount of reliable information would be available.

There is by now a great deal of accumulated experience on the value of the direction finder and over 1,000 bearings are taken every month by British ships, and over 90 per cent. of these may be accepted as correct—that is to say, with an absolute error of less than 2°. When it is considered that they are taken with reference to the direction of the ship's head by compass and allowance is made for the liveliness of the compass card, it will be seen that directional wireless has reached a very fine degree of precision.

HAROLD F. TOWLER (Extra Master).

# CHAPTER XII.

## MARINE REFRIGERATION.

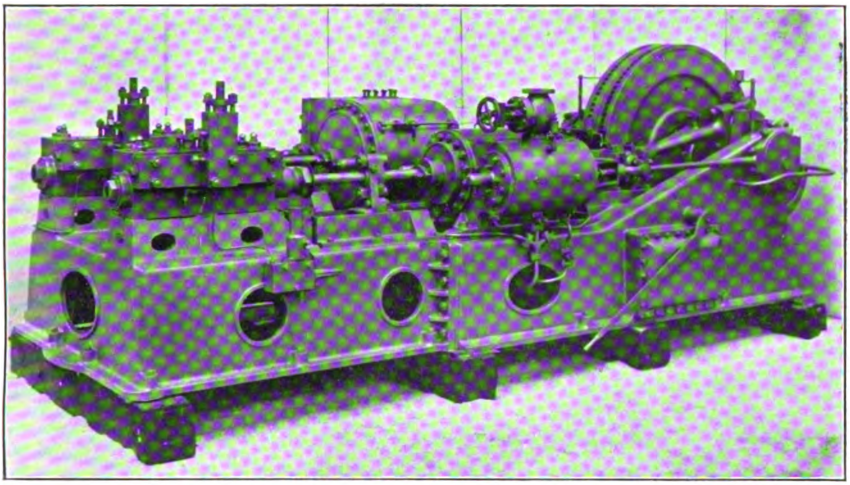
It is almost impossible to do justice to the subject of marine refrigeration within the limits of a brief chapter, but its importance can perhaps best be realized by considering what our position in this country would have been if the many problems presented by this branch of marine engineering had remained unsolved. It must certainly be admitted that if this country could not depend upon regular supplies of chilled and frozen beef and mutton, to say nothing of bacon, eggs, butter, apples, and in more recent years of such soft fruits as bananas, plums, peaches, and nectarines, as it can do to-day, our standard of living would of necessity be very much lower than it is.

It must surely be agreed also that no part of the marine engineer's work has done more to assist the development of many of the Dominions than refrigeration, for it is doubtful whether these great countries could have grown as they have done, without the outlet for those perishable products which they are so well fitted by nature to supply, which outlet has only been found by the aid of refrigeration. Again, apart from the maintenance of necessary supplies of foodstuffs in this country, the successful development of this trade has greatly stimulated the demand for refrigerated ships, thus benefiting the shipbuilding industry, and has also created the demand for the many large cold stores at our ports and inland, by means of which the seaborne supplies are distributed to meet the demands of the markets.

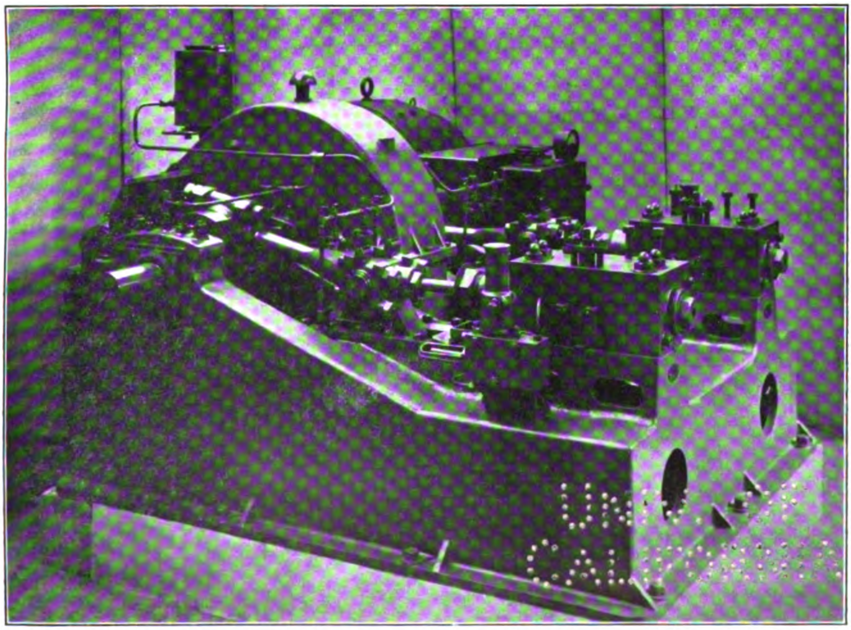
### THE COLD-AIR SYSTEM.

The first type of refrigerating machine to be fitted on board ship was what is known as the cold-air machine, in which air is compressed and afterwards allowed to expand while doing work, and being in this way reduced to a low temperature. It was this type of machine which was fitted on the famous Strathleven, on which the first cargo of frozen meat was brought from Australia in 1879, and machines on this principle are in regular use to-day, although practically none are being installed on new ships at the present time.

For frozen cargoes, the low temperatures produced and the reliability of the cold-air machines had certain advantages, but they want more power for producing a given refrigerating effect than the more modern compression machines, and are not nearly so convenient



STEAM-DRIVEN, DUPLEX $CO_2$ REFRIGERATING MACHINE OF 90 TONS REFRIGERATION CAPACITY.



ELECTRICALLY-DRIVEN, TWIN-COMPRESSOR $CO_2$ REFRIGERATING MACHINE OF 35 TONS REFRIGERATION CAPACITY.

(*Constructed by Messrs. J. & E. Hall, Ltd.*)

for applying refrigeration to its many modern uses on board ship. It is to the perfection of the compression type of refrigerating machine that the success of marine refrigeration, as we know it to-day, is due.

## COMPRESSION REFRIGERATING MACHINES.

The principle of the compression refrigerating machine is now so generally understood that it is really only necessary to say here that the refrigerating effect is produced by the evaporation of some volatile liquid such as carbonic dioxide or anhydrous ammonia, the evaporated gas being compressed, condensed and re-evaporated in a continuous closed cycle. For marine refrigeration the carbon dioxide ($CO_2$) machine is much more generally used, though there are a number of large meat-carrying steamers equipped with ammonia compression machines.

It would perhaps be interesting to consider why the use of $CO_2$ has become almost universal at sea, although it is practically unused on land—at least for land installations approximating in size to the large marine installations. It must be admitted that were two refrigerating or ice-making plants installed on land, one on the $CO_2$ system and one on the ammonia system, and the working conditions were identical in each case, the ammonia plant would be the more economical in operation. This advantage of the ammonia plant would become even more apparent if the two plants were operating in tropical climates with condensing water at a temperature of about 85° F. or 90° F., as nearly every marine installation has to.

The victory of the $CO_2$ system at sea seems to have come about largely owing to the great skill of the builders of these machines, by which their inherent unsuitability has been largely overcome, and also to the Board of Trade regulations which do not permit ammonia machines to be carried in the main engine-rooms. With the development of marine refrigeration, however, this latter reason seems largely to have disappeared as the refrigerating machinery is now nearly always housed in its own engine-room, and has its own staff of refrigerating engineers. It would thus appear that fear of the possibility of ammonia leakage, which it would not seem difficult to provide against, coupled with lack of appreciation of the comparative disadvantages of $CO_2$ are the chief causes for the popularity of the latter system.

## REFRIGERATING PLANT FOR SHIP'S STORES.

The applications of refrigeration to marine requirements fall into various classes. First, there is the small ship's-store plant for the cargo steamer. This may be of any size from 300 cubic feet to 1,200 cubic feet, and usually consists of a chamber divided into three portions—one a meat room held at freezing temperature; another a vegetable room, held at a low temperature above freezing; and the third a handling room into which the daily supplies of meat are brought for cutting up. Sometimes a small ice-making tank containing perhaps three or four small ice cans is placed in this handling room, and this is a very good provision to make, as the cost is infinitesimal and a constant supply of ice must do much to make life on board a vessel trading in tropical waters more bearable.

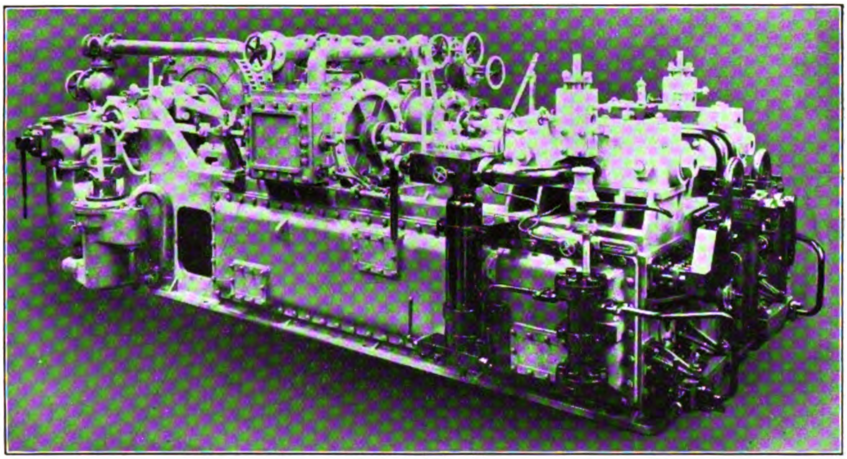
These small plants are often not placed in the main engine-room, but are arranged on some convenient deck with the cold rooms and refrigerating machines adjacent to one another. The installation is frequently arranged to operate on the brine circulation system, on the lines of the larger plants, but more recently there have been a number of such plants installed using ammonia compression and cooling the chambers by means of direct expansion pipes, similar to those employed in small land installations. The latter arrangement certainly seems preferable to the complication of the brine system, since it avoids the necessity for the brine evaporator and brine pump. When added to a vessel already in service, moreover, this system seems particularly suitable since except for the engine or motor driving the compressor no further power need be provided if the water service for the condenser is taken off the ship's sanitary service, as it well may be.

A small omission in these useful little plants that is often noticed is that the handling room is not provided with any cooling piping. Although low temperatures may not be necessary in this room, a small cooling coil should always be provided to avoid condensation on the walls. The room, which is really an ante-chamber to the storerooms, must of necessity be cooler than the atmosphere, with the result that whenever the door is opened and warm atmospheric air is allowed to enter, moisture is condensed on the walls, and damage to the insulation sooner or later sets in. It is surprising that these small ship's store refrigerating plants are not in more general use, as figures have been obtained showing that their cost is saved in less than a year by the prevention of loss of stores.

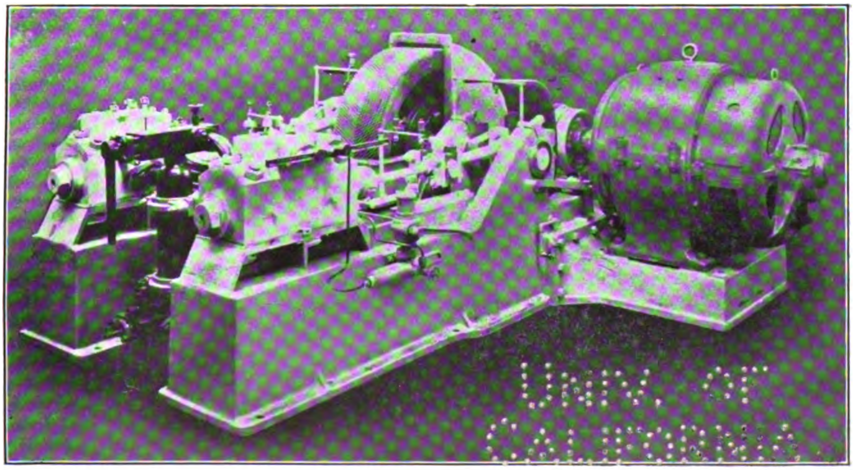
## LARGE CAPACITY PLANT.

The second application is the ship's store plant on a large scale for the moderate size or large passenger liner, and having a capacity of from 6,000 to 20,000 cubic feet. For such plants as these, the machinery is usually installed in duplicate, as its failure would have serious consequences. The machinery is generally placed in the main engine-room. Each compressor has its own condenser, but a common evaporator is often employed. The plant is operated on the open-tank system, the brine pumps drawing cold brine from the evaporator and discharging it into a header with leads to the various rooms. Besides the actual preservation of meat, vegetables, butter and other perishable products, such a refrigerating plant as this is nowadays almost always called upon to provide a low-temperature in special cupboards in the smoking-room bars, a cold drinking water supply, and to cool the daily milk supply produced by the "iron cow," as well as to make ice cream.

So far, the carriage of refrigerated cargo, as apart from consumable stores, has not been considered. The third class of refrigerating



STEAM-DRIVEN, DUPLEX $CO_2$ REFRIGERATING MACHINE WITH LIQUID PRE-COOLER.



ELECTRICALLY-DRIVEN, DUPLEX $CO_2$ REFRIGERATING MACHINE WITH LIQUID PRE-COOLER, FOR S.S. ORAMA.

*(Constructed by Messrs. The Haslam Foundry and Engineering Co., Ltd.)*

UNIV. OF CALIFORNIA

plant used on board ship may be considered as that for the carriage of a small quantity of refrigerated cargo, either with or without the provision of refrigerated space for ship's stores as already described. When such refrigerated cargo space is provided for, a duplicate plant is always installed, and unless special provision has to be made for the carriage of chilled, as opposed to frozen, meat, which is unusual except in the larger special meat-carrying vessels, the arrangement of the refrigerating plant is on the general lines of the larger provision-room plants above referred to.

## FROZEN AND CHILLED MEAT.

The fourth, and chief, application of refrigeration to marine work is the carriage of large quantities of frozen and chilled meat from Australia, New Zealand, and South America to this country. Before considering these installations it would be as well to make quite clear the difference between frozen and chilled meat. Frozen meat, to the refrigerating engineer, means meat that has been slowly frozen hard, the freezing process consisting of a primary chilling in a temperature above freezing point, in a special chamber provided with means for circulating the cool air, until the carcase is cooled right through at this temperature. The meat thus chilled is then removed to a freezing-room where the temperature is maintained at 5° F. to 10° F. until it is frozen hard all through. This process is, of course, carried through on land before shipment, and as long as the temperature does not rise above 15° F. or, better still, 12° F., such frozen meat may be stored practically indefinitely without losing its nourishing properties.

Chilled meat, on the other hand, is meat that has not been frozen hard. The chilling process is carried out on shore before shipment, and the refrigerating system is specially arranged to enable a perfectly regular temperature of 29·5° F. to be maintained. The necessity for distinguishing clearly between the chilling and freezing of meat is made apparent when it is explained that while mutton does not deteriorate in any way by being submitted to the freezing process, beef is greatly reduced in value. The result of submitting beef to freezing temperatures is to destroy the tissues of the meat and the market value is seriously reduced. Properly frozen mutton and properly chilled beef, when reasonable precautions are taken in thawing, can hardly be distinguished from fresh home-killed meat, though many *gourmets* wrongly insist that the contrary is the case.

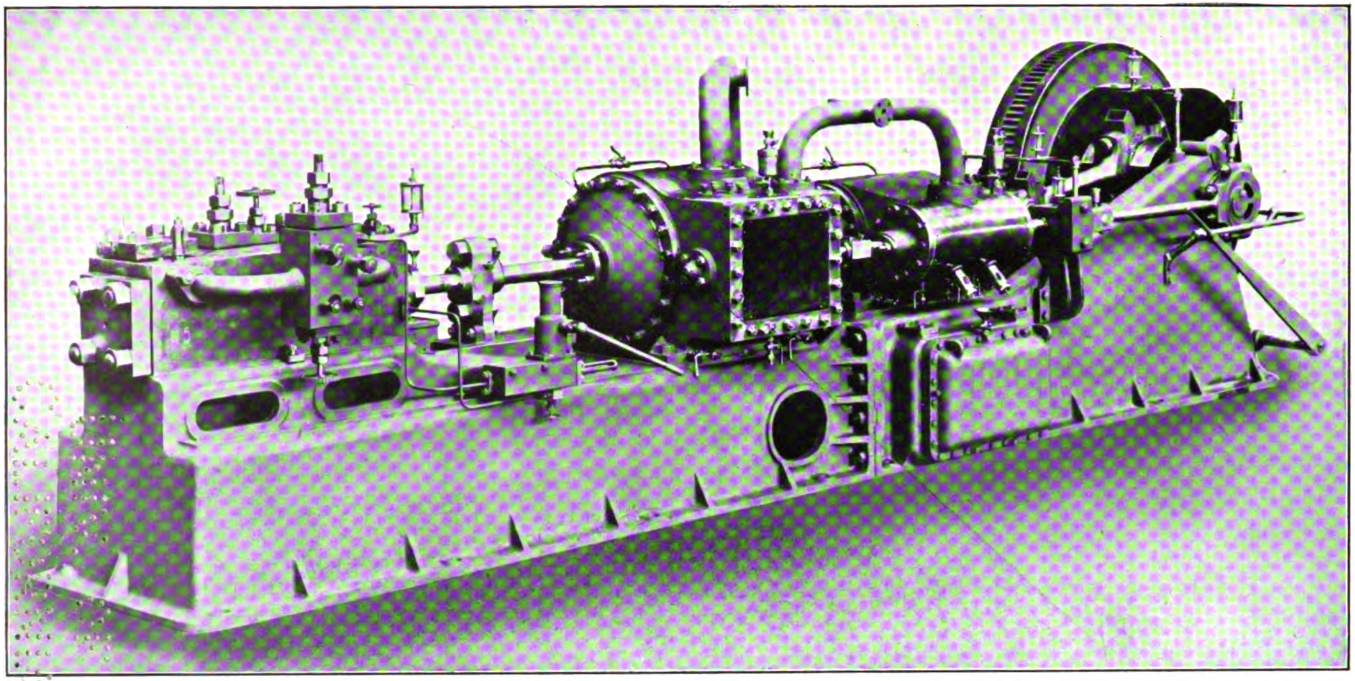
As has been stated, frozen meat can be kept almost indefinitely, but the period during which chilled meat can be stored is limited to three to four weeks. It follows, therefore, that the chilled meat trade is greatest from South American ports, from which the voyage to this country does not exceed this limit of time. Experiments have been made continually to enable this chilling period to be sufficiently prolonged to allow of chilled meat being carried from Australia and New Zealand. It is obvious that a rich reward awaits the successful solving of this problem, as the market value of chilled beef is so much greater than that of frozen beef. Experiments which promise to be successful have been, and are being, carried out on the principle of treating the air in the refrigerated space with vegetable germicides, which are harmless to the consumer, so that the combination of the destruction of the germs causing decomposition with the retardation due to the chilling temperatures may enable meat to be carried at these higher temperatures for the necessarily longer voyage periods.

### The Need for Temperature Control.

The conditions of marine refrigeration work being that the cargo spaces are practically sealed up, there being no continual inward and outward traffic as always occurs in a cold store on land, the load on the refrigerating machine is practically proportional to the flow of heat through the insulation, and will vary as the outside temperature. While this condition obtains during the course of a voyage, the refrigerating machine at the beginning of each voyage has to be large enough to reduce the whole of the cargo space, and the insulation, to the necessary temperature in a short space of time. Some system of accurate temperature control has, therefore, to be arranged to enable the very accurate limits of temperature referred to above to be maintained, as simply varying the speed of the engine would not answer the purpose. At the same time, provision has to be made for thawing the snow off the pipes at the end of each voyage, as the insulated spaces will be required for general cargo.

The installation for the big meat-carrying steamers being on a large scale, the capacities nowadays running up to 400,000 cubic feet, a considerable space has to be devoted to the refrigerating machinery, condensers, evaporators, water and brine pumps, and the valve control system to enable this necessary accurate temperature control to be achieved. The usual arrangement is for the refrigerating machinery, in duplicate, to be arranged in a 'tween deck space, adjacent, and with access to, the main engine-room. On one side of this refrigerator engine-room are arranged the $CO_2$ condensers, consisting of coils of pipes (usually copper) in cast-iron casings. Then, in an adjacent insulated space, are the evaporators, consisting of solid-drawn steel tubing in wrought-iron casings, and the return brine tank and control headers. The brine pumps are usually arranged with the pump bodies in the insulated space, and the steam cylinder or motor outside this in the engine-room.

For securing the very accurate brine temperature control necessary, the brine circulation is arranged so that the pumps draw from the brine control tank, and discharge through the evaporators, then to the three main control circuits for freezing, chilling, or thawing brine. The brine return tank, into which every circuit returns, is arranged in three portions—freezing, chilling, and thawing—and, by a simple arrangement, the return brine from any one circuit can be quickly diverted into either the freezing or the chilling portion. By having one brine pump circulating chilling brine and another circulating freezing brine, each drawing from the relative portion of the brine return tank, and diverting freezing brine into



STEAM-DRIVEN $CO_2$ REFRIGERATING PLANT FOR S.S. FORDSDALE AND S.S. FERNDALE.

*(Constructed by Messrs. The Liverpool Refrigeration Co., Ltd.)*

the chilling circuit as necessary, an extremely accurate temperature can be maintained. Further, any one circuit can also be thawed off, by circulating warm brine through it whenever it is required to remove the snow from the pipes. When the size of these modern marine refrigerating plants is considered, and the fact that there may be as many as 200 different brine circuits is borne in mind, it becomes obvious that the pipe system is one of considerable complexity.

### THE TRANSPORT OF FRUIT.

A rather more recent development in marine refrigeration is the carriage of fruit, especially bananas and apples. The carriage of bananas has now almost become an industry in itself, a whole fleet of vessels being equipped with refrigerating plant specially arranged for the purpose. The quantity of this fruit now available here, and its excellent condition, afford ample proof of the complete success which has been attained in this particular application of refrigeration. The fruit is picked unripe and stowed in crates in the holds, but in this case the method of cooling by brine cooling pipes in the holds is not practised. Adjacent to the holds to be cooled, air coolers are installed consisting of stacks of brine piping over which air is circulated by means of powerful fans. Provision must be made for drawing in fresh air from time to time, and for reversing the flow of the air. Great care also must be taken to stack the fruit properly so that the air can pass freely round all the cases.

The successful carriage of apples is a subject that has been receiving great attention recently, and to those interested a study of the reports issued on the subject by the Food Investigation Board will be found of the greatest utility. Apples have usually been carried in holds provided with brine cooling pipes, and with fans for circulating the air. It is certain that, in the carriage of fruit, the function of the refrigerating plant is to retard the ripening process. Fruit, however, is alive, and is thus generating $CO_2$, and it can only survive, in health, in an atmosphere in which the proportion of this gas is not excessive.

Almost as important as the refrigerating plant, is the insulation of the refrigerated holds. There is now a very large number of different insulating materials the function of which is to retard the flow of heat through them. The materials most commonly in use are charcoal, slag wool, granulated cork, and slab cork. The three former substances have to be packed between linings, while the latter is self-supporting. All these three substances have their advocates, but it would seem likely that slab cork will come more and more into general use. Slab cork is now in almost general use as an insulating material in land refrigerating plants, and the ease with which it can be applied, with the fact that its insulating properties are well maintained, seem likely to increase its use. This material, moreover, readily lends itself to being covered with one of the various cement finishes, thus furnishing a very hygienic surface, which is easily kept in a clean condition.

## PROGRESS WITH MACHINERY.

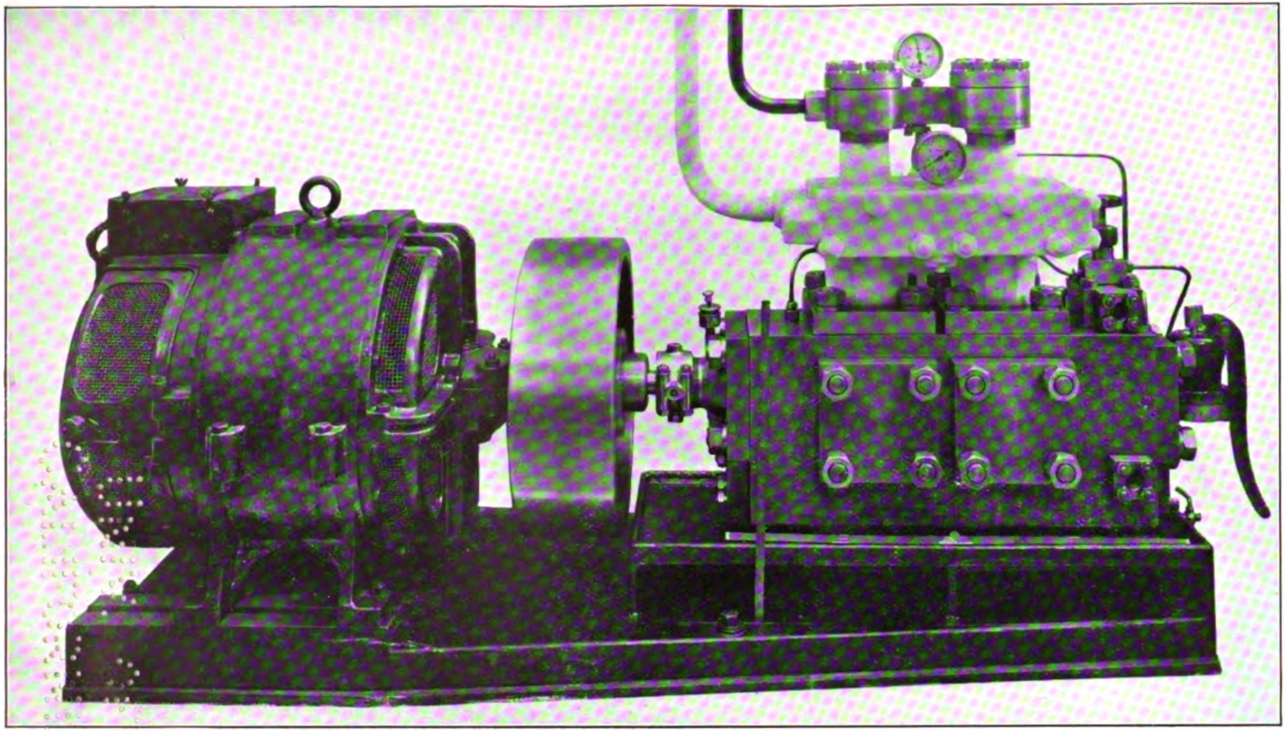
While refrigerating machinery for use at sea has to be provided to meet requirements differing from those encountered in land refrigeration—just as the marine engine differs from the land engine—it can hardly be denied that the progress of marine engineering is profoundly affected by the progress of land engineering, and that sooner or later marine engineers will adapt to their special purposes all the improvements effected in engineering on land. For example, we have seen the application of the steam turbine to ship propulsion, and of more recent years the application of the internal-combustion engine, and it may therefore be interesting to consider how the various types of refrigerating machines have altered in recent years. Up to the conclusion of the war it must have been obvious to all who have considered the matter, that the design of refrigerating machines had remained almost stationary. A study of the advertisements in the papers devoted to the subject would show that exactly the same machines were being offered for sale at that time as was the case twenty years previously, and as the industry is such a comparatively young one, this means that it reached the earlier state of development very shortly after its inception.

## INCREASED RUNNING SPEEDS.

Immediately after the war, however, a noticeable change was apparent. While up to that time such improvements as had been made were devoted to matters of detail, shortly after 1918 almost every firm connected with the trade began to instal, for land use, compressors running at a much higher rate of speed than had previously been customary. The increasing application of electricity as a motive power has probably been largely responsible for this movement; but is not exactly the same demand likely to arise in marine applications? In marine practice the driving of auxiliary plant by electricity is greatly on the increase.

A cursory inspection of marine refrigeration units seems to show that this change has caught the refrigerating engineers unprepared. Electrically-driven units are the old steam-driven plants with what might almost be called an extemporized electric drive through gearing. Surely gearing is undesirable if it is avoidable, and if it can be avoided on land, as it has been, it is fairly certain that the adaptation of the marine refrigerating machine to the higher rate of revolution suitable for direct electric drive is not far distant. Another advantage would also follow this line of progress, namely, reduction in weight. For a given capacity the weight of the plant will be reduced as the speed is increased, and it would also seem probable that the tendency will be for the plant to be more divided into units, which should increase economy of operation in the very variable conditions of load which must obtain in the different temperature conditions experienced.

A further line of progress would also seem to be indicated, if there is any truth in the assumption that improvement must first



DIRECT-COUPLED, ELECTRICALLY-DRIVEN VERTICAL MARINE-TYPE $CO_2$ REFRIGERATING MACHINE.

(*Constructed by Messrs L. Sterne & Co., Ltd.*)

be effected on land before it can be adapted for use at sea, where reliability is the first essential. The type of condenser and evaporator used in marine refrigerating plants has hardly altered at all. On land, particularly in America, the size and weight of condensers and evaporators has been greatly reduced of late years. The shell type of evaporator in which the refrigerant is evaporated in the casing, and the brine passes through the tubes is perhaps hardly applicable in that form to use with $CO_2$, but an application of the principle would seem to repay investigation.

### THE MULTIPLE-EFFECT SYSTEM.

In commenting on the apparent lack of innovation in marine refrigerating practice, reference should be made to the system known as "multiple effect." This system was originally advocated by a well-known American engineer and has been adapted for marine purposes by British firms and improved by engineers in this country. The principle involved is that the compressor is constructed with an auxiliary suction valve or port, so that a charge of gas at some higher pressure than the evaporating pressure can be admitted to it after the cylinder is full at the lower pressure. The evaporation at the lower pressure takes place in the evaporator in the usual way, that at the higher pressure taking place in a liquid receiver from which the evaporator is supplied. This latter evaporation serves to cool the condensed $CO_2$ before it reaches the evaporator and ensures a perfect liquefaction. It is claimed that an increased refrigerating effect is obtained for a given expenditure of power, especially under high-temperature conditions, and this is a reasonable claim consistent with theory and apparently obtainable in practice.

In this chapter an endeavour has been made to describe briefly, in as untechnical a manner as possible, some of the main features of refrigeration in its application to marine work. As has been indicated, the subject is one of great importance to every inhabitant of Great Britain. Reference to any particular firm manufacturing refrigerating machines has been carefully avoided, though thanks are due to those firms who have kindly placed information at the disposal of the writer.

# CHAPTER XIII.

## THE PORT OF LIVERPOOL: ITS PAST AND FUTURE.

UNTIL the completion of the old dock in 1715, vessels using the port of Liverpool were forced to anchor in the river for shelter, or in the small creek shown on old maps as " Ye se Lake," or as " The Poole " (see reference 13 in the picture of Liverpool as it appeared in 1650 on the Plate facing page 292), which afterwards was to become the site of the " Old Dock." It is, however, of interest to trace, so far as it is possible, the earliest developments of the port before the old dock came into existence.

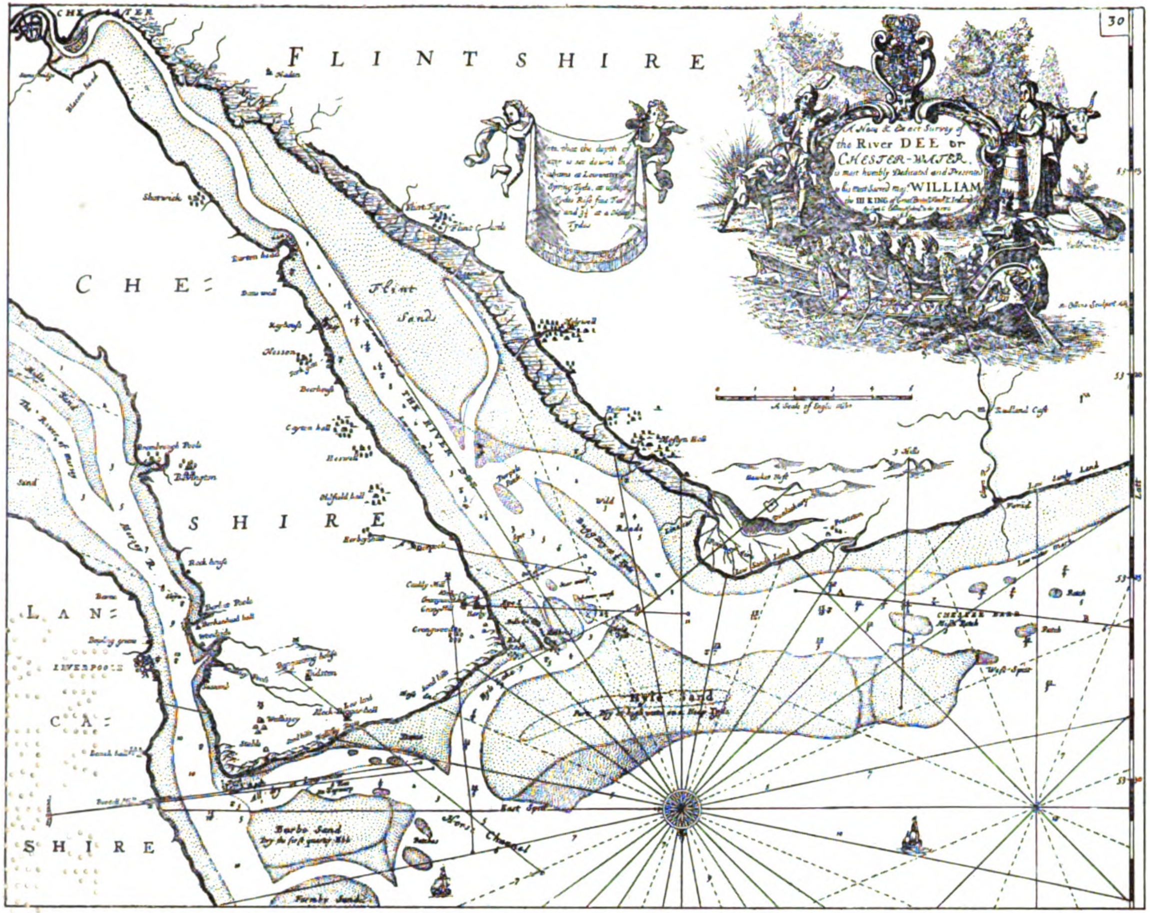
It seems probable that the intercourse between England and Ireland, following on the wars of Henry I., laid the foundation of the commerce of the port in some degree, and during the next century, in the year 1207, eight years before the Magna Charta was signed, King John granted a Charter to the borough, the seal of which is of silver, and oval in form. This seal is still in the custody of the corporation. Although the charter was granted in 1207, it is difficult to find any reliable records of the shipping coming to the port until 1546. Leland, who was one of Henry VIII.'s chaplains, gives the following account of the town in 1545 :—

> Lyrpool, alias Lirpool, a pavid town, hath but a chapel. Waleton, iiij miles off, not far from the se, is pariche chirch. The King hath a castelet there, and the Erle of Darbe hath a stone house (the tower) there ; at Lyrpole, is smaule custume payid that causith merchants to resorte ; Yrisch merchants cum much thither as to a good haven, good merchandis at Lyrpole, and moch Yrisch yarn, that Manchester men do by there.

There were twelve " Shippes " about that time belonging to merchants and others in the town, 223 tons burthen in all. In 1560 there occurs in an old record these words : " From the Wide and extended Port of Chester to the little creek of Liverpool. The little creek of Liverpool had belonging to it 15 Barks from 15 to 35 tons burthen."

## THE OLD HAVEN OF THE SIXTEENTH CENTURY.

That there was some protection even then for ships is proved by a record of 1561 that Liverpool was visited by a great storm which destroyed the jetty or breakwater of the old haven, an occasion on which the mayor summoned the whole town together to consider ways and means for repairing the damage caused to the only protective harbour for shipping which the town possessed. At this meeting, a decision was arrived at forthwith to build a new harbour or dock with a secure entrance, defended by stone piers against



THE APPROACHES TO LIVERPOOL AND CHESTER, 1639

any possible dangers and "so as to direct the stream to flood the new harbour." For more than a century this harbour was sufficient for the limited trade of Liverpool at that early period.

In 1586, Camden, who was celebrated in those days as a topographer, visited Liverpool in the course of his survey of Britain. In his historic work entitled "Britannia," published in May 1586, the following notice of the town will be found:—

> The Mersey spreading, and presently contracting its stream from Warrington falls into the ocean with a wide channel, very convenient for trade; where opens to view, Lifeppole, commonly called Lirpool, from a water extending like a pool, according to the common opinion; where it is most convenient and most frequented passage to Ireland; a town more famous for its beauty and populousness than its antiquity.

In 1596, a vessel arrived in Liverpool from London having a cargo of iron, tin, sugar, and shumac valued at £1,000, and a few years later there is a record of the earliest table of Town Dues.

## Liverpool as a Dependent Port.

In 1618, the Mayor of Chester was required by a letter from the Privy Council to transmit an account of all ships and barges belonging to the chief port of Chester and its dependent ports. The Mayor of Liverpool at first declined to acknowledge that that port was dependent on Chester, but afterwards was obliged to submit. The following is a summary of the Report made in consequence:—

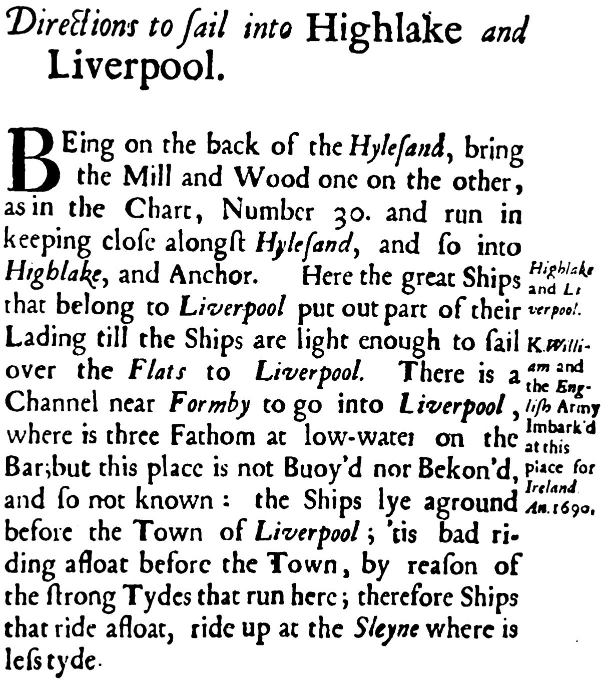
| | No. of Vessels. | Tonnage. | Men belonging. |
|---|---|---|---|
| Chester and its creeks . . . . . . . . . | 15 | 383 | 63 |
| Dependent ports— | | | |
| Liverpool and its creeks . . . . . . . | 24 | 462 | 76 |
| Beaumaris and its creeks . . . . . . . | 3 | 34 | 9 |
| Carnarvon and its creeks . . . . . . . | 2 | 26 | 6 |

It was not until 1647 that Liverpool became a free and independent port subject no longer to Chester.

Tobacco was one of the earlier imports into Liverpool, and it was recorded in 1648 that 30 tons of tobacco arrived in the port in a ship called the "Friendship," on which cargo a duty of £3 was charged. This first importation into Liverpool occurred fifty years after Sir Walter Raleigh had introduced the weed into England, and no doubt was a big consignment in those early days.

The sailing directions for Liverpool in 1670 were very different to any which exist at present. Collins' map and survey, published in the reign of William III., showed that "the great ships that belong to Liverpool put out part of their lading in Hyle (Hoyle) Lake, till the ships are light enough to sail over the flats to Liverpool" (see p. 292). It seems that the increasing number of vessels which mostly had to anchor in the river from lack of proper accommodation about the beginning of the eighteenth century, caused considerable injury and inconvenience to one another by collisions. A petition was presented to the Council in January 1702, complaining of the damage the vessels received, and the Council in consequence passed a number of Orders and Regulations with penalties in the hope of deterring offenders. The water bailiff was given full power to order the proper mooring of vessels to ensure the best use of the anchorage and to bring those who refused to obey his orders before the Mayor, the showing of his silver oar being a sufficient warrant for the same without further summons or process.

In 1709, the tonnage entering and leaving the port amounted to 27,210, and in this same year the first vessel sailed from Liverpool to Africa, "the burthen of the vessel not exceeding 30 tons."



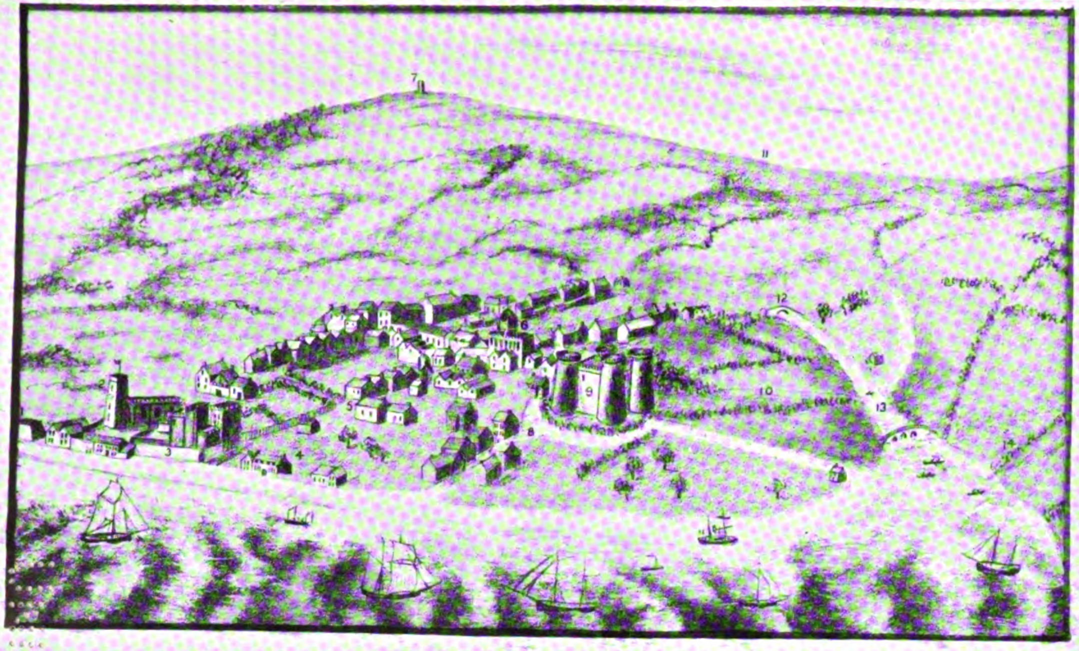
## *Directions to ſail into* Highlake *and* Liverpool.

Being on the back of the *Hyleſand*, bring the Mill and Wood one on the other, as in the Chart, Number 30. and run in keeping cloſe alongſt *Hyleſand*, and ſo into *Higblake*, and Anchor. Here the great Ships that belong to *Liverpool* put out part of their Lading till the Ships are light enough to ſail over the *Flats* to *Liverpool*. There is a Channel near *Formby* to go into *Liverpool*, where is three Fathom at low-water on the Bar;but this place is not Buoy'd nor Bekon'd, and ſo not known: the Ships lye aground before the Town of *Liverpool*; 'tis bad riding afloat before the Town, by reaſon of the ſtrong Tydes that run here; therefore Ships that ride afloat, ride up at the *Sleyne* where is leſs tyde.

*Highlake* and *Liverpool*. K. *William* and the *Engliſh* Army Imbark'd at this place for *Ireland An.* 1690.

### First Enclosed Dock ever Built.

At this time the want of a regular dock was felt and an Act of Parliament was passed entitled "An Act for making a convenient Dock or Bason, at Leverpoole, for the security of all ships trading to and from the said Port of Leverpoole"; by virtue of which "The Mayor, Aldermen, Bailiffs, and Common Council" of Liverpool and their successors were appointed trustees for seeing the work carried out, with the result that the construction of the first Liverpool dock (the "Old Dock"), which at one time was called the Custom House Dock, was commenced, and an Act passed in the third year of the reign of King George I. (1716) extended the time for completing the works which had progressed so far as to enable the dock to receive and harbour ships, although no landmarks, buoys, etc., had been placed. When the dock was completed, the



# LIVERPOOL

AS IT APPEARED IN 1650.

1 The Battery.
2 Old Church.
3 The Tower.
4 Custom House.
5 Water Street.
6 Town Hall.
7 Beacon Everton.

8 James Street.
9 Old Castle.
10 Pool Lane.
11 Low Hill.
12 Townsend Bridge
13 The Pool.
14 Road to the Park

Presented by John Rankin, Esq., of Liverpool, to the Mersey Docks and Harbour Board, Aug. 15th, 1907

walls or sides were of brick with stonework above. The dock ran eastward and westward in the direction which the old pool had formerly taken, the westward part being somewhat wider than the eastward. This dock was the first enclosed dock built, and Liverpool may, therefore, be looked upon as the pioneer in dock construction.

### Signs of Progress.

Shortly afterwards, in the year 1717, additional powers were obtained to build another dock, called at first "The Dry Dock" and later "Canning Dock." Consequent upon the making of the first dock the great increase in the numbers and size of the vessels using the port caused the necessity for regulating the buoys on the banks of Hoylake to be brought before the Council, who, in November 1736, ordered Mr. Steers, the Dock Master, to take immediate steps to have the buoys placed in proper places for the safe direction of all ships.

In 1738 the tonnage had increased to 39,843. Incidentally it seems that Mr. Steers, who was the first Dock Master, had a wide range of activities; in addition to designing the dock and becoming the first Dock Master, he also acted as Water Bailiff, was responsible for the buoyage of the channels to Liverpool, and was the architect for St. George's Church! The Rock and Horse Channels are always mentioned in the approach to Liverpool from the sea, no reference being made to what are now the main channels, which with the exception of the Crosby Channel, appear to have been unknown until 1833.

In 1737 an increase in the African trade was noticed, 33 vessels sailing to Africa alone during that year, an increase of 18 vessels in five years.

### Liverpool in 1743.

During the reign of George II. (1738) an Act was passed which authorised the making of an additional dock and the building of a pier on land owned by the corporation, adjoining the north and south sides of its entrance. This dock, which was called the Salthouse Dock or South Dock, was opened in 1753, the pier forming the sea wall or westward boundary of the intermediate space, then known as the Dry Dock, extending from the old dock gut to the river.

An author, describing Liverpool in 1743, states "that it may vie with Bristol, the customs having increased eight or ten fold within the last forty years, and that they continue to build handsome houses of brick." Further he says, "the trade is carried on principally with the Baltic and Norway; the British colonies in America; to Guinea, Ireland, France, and Spain, Portugal and Italy; so that there is no trade, except that of Turkey, Greenland and the East Indies, in which they are not concerned."

The number of ships belonging to Liverpool was at this time 437, viz.: 83 in the African trade, 124 in the American and West

Indian and Foreign Trade, 28 to various ports of Europe, 21 in the London cheese trade, 101 coasters, and 80 sloops. In 1753, the provision of new dock accommodation had increased the tonnage to 75,510.

The First Post passed on September 26, 1757, through Ormskirk from Liverpool to Preston, and the first regular stage coach between Liverpool and London was established three years later, occupying four days on the journey.

## EARLIEST CANAL IN ENGLAND.

The Sankey Navigation Act was passed in 1755, by which certain private individuals were authorised "to make a small river, the Sankey Brook, navigable from the Mersey about two miles below Warrington, up its three branches, viz.: to Boardman's Stone Bridge, near St. Helens, on the south branch; to Gerrard's Bridge, on the middle branch; and to Penny Bridge, on the north branch." This was the first canal made in England.

## DOCK COMMITTEE.

No mention of a Dock Committee is made until September 1761, when the desirability of placing the dock management under the control of a body distinct from, though allied to, that which looked after the ordinary town's business, was brought under notice by the volume of work in connection with the management of the docks, together with the ever-increasing demands for further dock accommodation owing to the spreading trade of the port.

Subsequent events have proved, by the enormous extension of the dock system, that this agitation was not without ample justification, and that even at this time a great future was contemplated for the use of these docks by the increasing trade. In 1763, the tonnage had increased to 109,757.

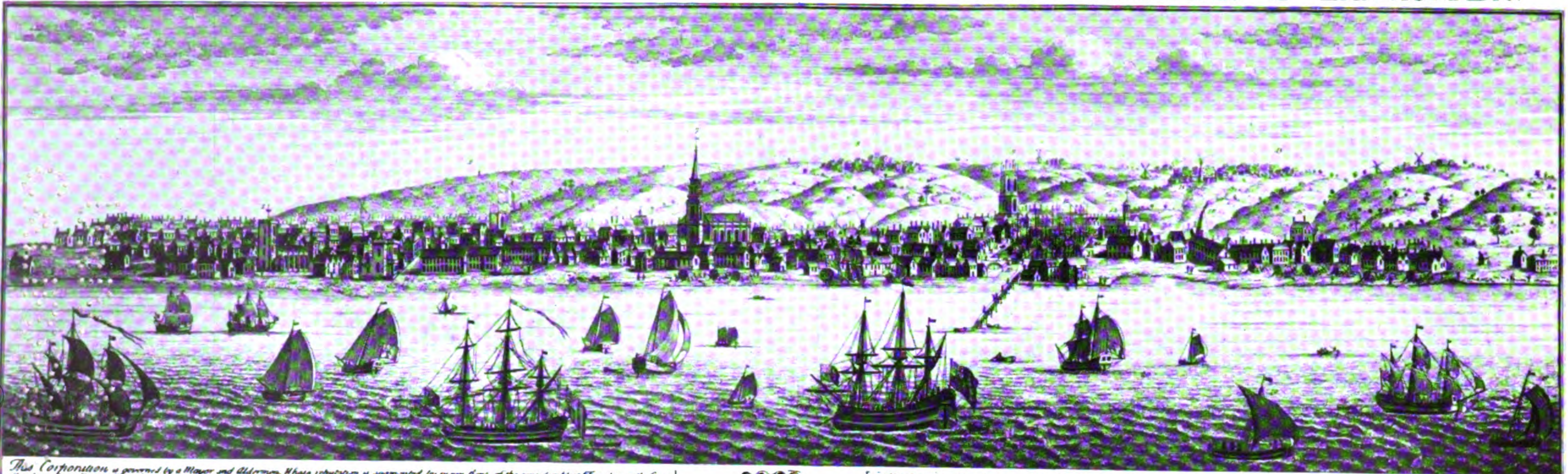
## RIVALRY WITH BRISTOL.

The port had for many years been a rival of Bristol, but the commerce of Liverpool had now doubled that of this competitor as the following figures will show: In 1764, 74 vessels sailed to Africa from Liverpool, 32 from Bristol; 141 to America, 105 from Bristol. Liverpool entered inwards 766 vessels, and Bristol 332; Liverpool outwards 832, and Bristol 343.

The next dock constructed in Liverpool was the George's Dock, sometimes called the North Dock or New Dock, the Parliamentary authority being obtained on May 19, 1761, by an Act of George III. On October 1, 1762, a violent hurricane blew down about 30 yards of wall on the eastward side, which was the only part then completed, and otherwise damaged the works. This dock had a very large tidal basin attached to it, and was the principal resort of West Indian and South American shipping. The tonnage in 1771 had reached the figure of 150,455.

The important question of inland navigation by means of canals

THE SOUTH WEST PROSPECT OF LIVERPOOLE, IN THE COUNTY PALATINE OF LANCASTER.



*This Corporation is governed by a Mayor and Aldermen, whose reputation is augmented by many Gent. of the considerablest Families in the County that have been Mayors thereof. And likewise it conduceth much to its advantage in Trade, by the Freemen of the Town having the same free Priviledge as Bristol in England and at Waterford & Wexford in Ireland. Roger of Poictiers who was Lord of the Honour of Lancaster built a Castle here, which now is entirely demolished. This is the most flourishing and populous Sea Port Town in these parts, being beautiful in its Buildings, and no less pleasant in a large & well contrived Dock, wherein Ships are lading & unlading before the Custom House. This is said to rival Bristol the 2nd Port in England and is the most convenient for frequent Passage into Ireland, which, together with their Trade to the West Indies, and the several Manufactures of places adjacent, are Reasons that of late Years it hath flourished, and doth still continue so much to increase. This Borough sends two Members to Parliament.*

1. St. Nicholas's Church.
2. Water Street.
3. The Old Tower.
4. The Beacon.
5. The Exchange.
6. The Tobacco Pipe.
7. The New Church
8. Yerton
9. St. Peter's Church.
10. The Dock.
11. The Custom House
12. The Charity School
13. The Copperas House
14. The Glass House
15. Law hill
16. The Sugar House
17. The Bowling Green House
18. Eastham Ferry Boat
19. Rock house Ferry Boat.
20. The River Mersey

S. & N. Buck delin. et sculp. 1728

1728

received a forward movement about this time. A scheme was started for forming a canal between Liverpool and the St. Helens district. The Duke of Bridgwater appears to have been credited with being the pioneer of canals, but as his canal between Manchester and Runcorn was not opened until 1772, the Sankey Brook, which has been previously mentioned, must be considered the first navigable canal in England.

## BEGINNINGS OF THE COTTON TRADE.

Cotton, an article which has had so much to do with the development of Lancashire and the extension of the Dock Estate, was at that time imported in very insignificant quantities, principally from the British West India Islands and the Mediterranean.

It may be well to mention here, in order to show how comparatively recent is the date of the first importation of North American cotton into Liverpool, that in the year 1784, eight bags of cotton imported from the United States of America arrived in an American vessel, but this consignment was seized by an officer of the Customs as he was under the impression that cotton was not grown in America. In those early days of cotton importation, the method of packing was very different to that which exists to-day. For instance, some of the earlier importations came in barrels, and among a large quantity imported during one year only three packages are recorded as having come in the form of bales.

## DEVELOPMENT OF THE COASTING TRADE.

In 1775, the coasting trade in Liverpool had assumed considerable dimensions, as there were about twelve good sized vessels employed as regular traders, which conveyed goods between Liverpool and London. Some of them also traded between Liverpool and Bristol, Hull, Glasgow, Dumfries, Chester, Preston, Lancaster, Milnthorpe, Ulverston, Whitehaven, and Carlisle. The exports were largely the productions of Manchester, Leeds, Sheffield, and Birmingham, with a great deal of earthenware from Staffordshire, and salt from Cheshire. It is reasonably certain that the trade in salt, combined with the facilities for bringing it down the river for shipment, was in a large measure responsible for laying the foundation, many years ago, of the commercial greatness of Liverpool.

An Act for the construction of the King's and Queen's docks was obtained on May 18 of the year 1784. In this same year, the amount of Liverpool duties at the Custom House was £648,684; that of Bristol £334,909.

It is recorded that 350 vessels sailed out of port in one tide on Sunday, February 19, 1791. The tonnage in 1793 had increased to 446,952 tons.

## 1800–1857.

For the sake of brevity, it may be well to deal with the period from about 1800 until 1857, when the docks were finally vested in trustees apart from the Corporation, as a whole. Inventions of every description had caused expansion in all directions and had assisted in the extraordinary industrial development of the United Kingdom. Increasing calls were made upon Liverpool by the north and midland towns of Britain, which were benefiting by the industrial expansions, to supply facilities for the importation of raw materials and foodstuffs; and in addition the export trade of the country was expanding.

In 1815, steam boats were introduced on the Mersey, and ten years later the railway between Liverpool and Manchester was commenced and opened five years after. It is almost unnecessary to comment on the enormous impetus this, and other railways built shortly afterwards, gave to the commerce of the port. The Prince's, Clarence, Brunswick, Waterloo, Victoria, Trafalgar, Coburg, Toxteth, Harrington, Albert, Salisbury, Collingwood, Nelson, Stanley, Bramley-Moore, Wellington, Sandon, Huskisson, and Wapping docks were all opened during this half-century.

In 1838, the "Royal William" made the first steam voyage from Liverpool across the Atlantic, and in the same year a through road was completed between Liverpool and London.

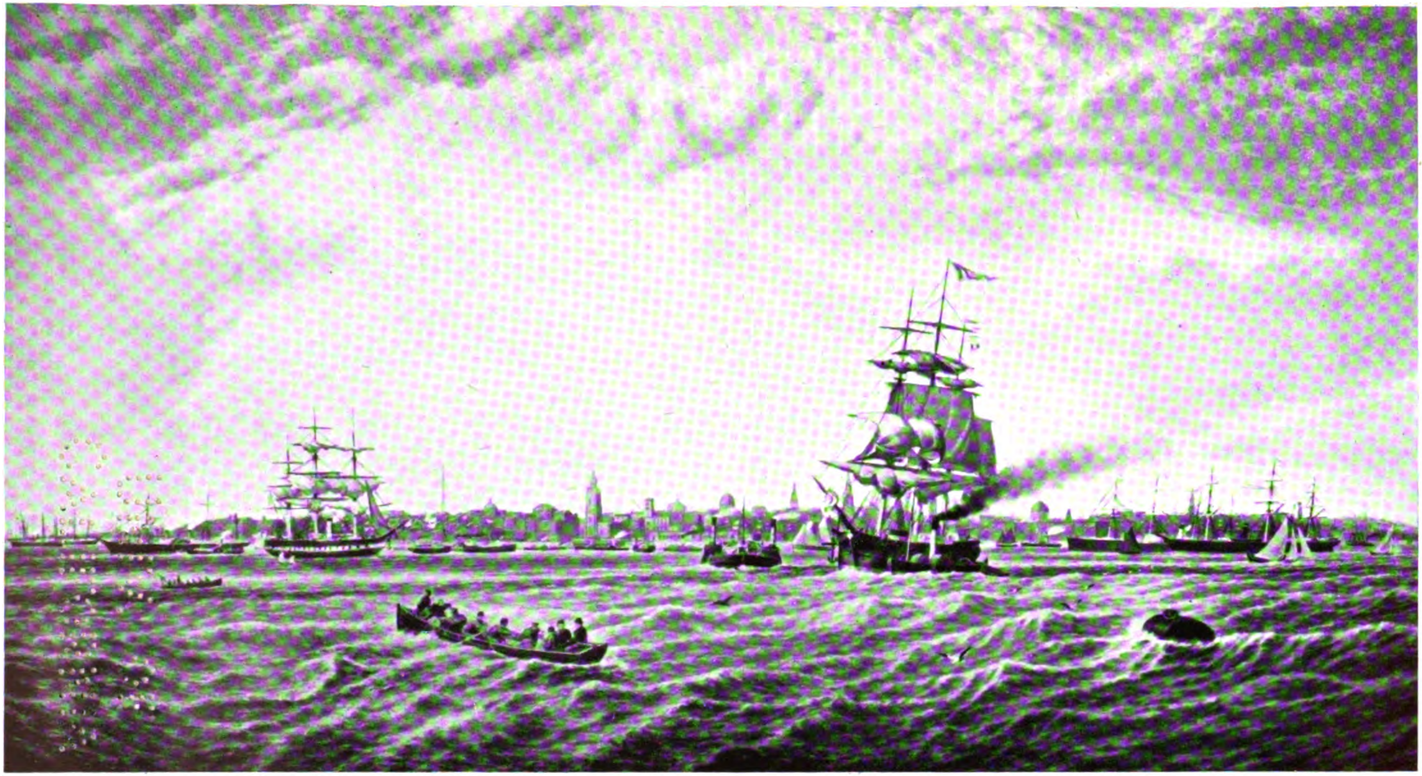
## 1857 TO PRESENT DAY.

Coming now to the year 1857, when the control of the docks passed out of the hands of the Corporation and became vested in the Mersey Docks and Harbour Board, it may be recalled that the estate came into being early in the eighteenth century, and until 1825 was administered by the Corporation of Liverpool. In 1825, the dock ratepayers, *i.e.* the traders, shipowners, and merchants, obtained a share in the management and a still further share in 1851. There were then two dock estates on the Mersey, one in Liverpool and the other in Birkenhead. The latter was under two bodies, one a trading company and the other a public trust. Both these concerns were purchased by Liverpool in 1855, after they had become practically insolvent.

The town dues levied on all goods imported and exported had for many years been the cause of serious complaints on the part of traders in the North of England, and there seems little doubt that these dues had been applied by the Corporation, in a great measure, for town purposes, as distinguished from dock and harbour purposes, a course which was considered by the merchants, shipowners, and dock ratepayers to be an improper use of the money and was in effect a tax on trade.

In 1857, a Bill promoted by the Manchester Chamber of Commerce, the Manchester Commercial Association, and the Great Western Railway was passed. It provided, *inter alia*, that:—

1. There should be 21 Dock Trustees.
2. The Dock Trustees should take over the Corporation Dock Estate debt.
3. On payment of a lump sum the Town Dues should become the property of the Dock Trustees.



Victoria Dock.
Waterloo Dock &
Corn Warehouses

Princes Dock &
Great Landing Stage.
St. Paul's Church.

St. Nicholas Church
Tower Buildings.
Baths.
Town Hall.

Public Offices.
St. George's Church.

Custom House.
Albert Dock Warehouses.
Tobacco Warehouses

PORT OF LIVERPOOL.
1877.

4. The Birkenhead Estate should be taken over by the new Trustees.

## Constitution of the Dock Board.

The first meeting of the newly constituted Dock Board was held in January 1858, and later in the year, under the Consolidation Act of 1858, the trustees were increased to 28 in number, of whom 24 were to be elected by the dock ratepayers, whilst 4 were to be nominated by the Government, and this, together with many other provisions in the 1858 Act, hold good to-day.

To be elected to the position of a member of the Board is looked upon as a great honour and one carrying with it the heavy responsibility of fairly administering the estate to the best advantage of those making use of the facilities. Neither the Chairman nor the members receive any remuneration for the services rendered by them. Any surplus of revenue in a given year, after payment of expenses including Bond interest, can only be used either to effect improvements on the dock estate, or to reduce the dues on shipping and goods.

In 1858, the enclosed water area of the dock estate covered 213 acres with a lineal quayage of 22½ miles. The tonnage entering and leaving the port at this time amounted to 8,883,886 tons annually.

## Progressive Extensions.

Between 1858 and 1873 the Huskisson, Branch No. 2. Carriers, Canada, and Herculaneum Half-Tide Docks were added to the estate, and other improvements were made to existing docks by very extensive remodelling. In 1873, however, it was found that the increase in size of vessels rendered it imperative to provide even more dock accommodation, and the Board obtained powers to expend £4,000,000 on new docks, both at the north and south end of the estate. This led to the construction of the Brocklebank, Langton, and Alexandra Docks, the latter being opened in 1881 by the then Prince (late King Edward) and Princess of Wales.

With a view to keeping the docks up-to-date in every respect, the Toxteth, Herculaneum and Harrington Docks were reconstructed under the Act of 1873.

Again, in 1898, the Board obtained an Act to effect varied and important improvements in the quayage of the Canada and Huskisson Branch Docks, and to carry out work connected with the Canada Graving Dock. Various docks and basins were reconstructed and a new half-tide dock made, more depth of water being provided at certain entrances, and passages widened and deepened in some of the systems.

In 1906, Parliamentary powers were obtained for carrying out a large extension of the dock system at the north end of the Liverpool estate.

### Gladstone Dock System.

In 1913 the Gladstone Graving Dock was opened by His Majesty King George V. This graving dock will form part of the Gladstone Dock system now under construction, of which some details will be of interest.

The graving dock, which can also be used as a wet dock, is the largest dry dock in Europe. The length of the dock, from the head to the inner caisson sill, is 1,050 ft. The width of the entrance is 120 ft., and the width of the dock is 141 ft. at the bottom, and 155½ ft. at the top. A single-storey shed extends the full length of the north quay. This dock is now being enclosed in order to form part of the system of wet docks described below and from which the graving dock will be entered.

*A New River Lock Entrance.*—1,070 ft. in length, and 130 ft. in width, divided into two sections, and having sills 20 ft. below Liverpool Bay Datum.

*A Vestibule or Turning Dock* (called the "Gladstone Dock"), having a water area of about 22 acres.

*A Lock,* 645 ft. long and 90 ft. wide, divided into two sections, between the existing Hornby Dock and the Vestibule Dock.

*A Branch Dock* (called the "Gladstone Branch Dock, No. 1"), 1,420 ft. long and 400 ft. wide, opening out of the vestibule dock in an easterly direction, and having treble storey ferro-concrete sheds on its north and south sides of the following dimensions:—

| | Length. | Width. |
|---|---|---|
| South shed . . . . . . . . . | 1,502 ft. | 150 ft. |
| North shed . . . . . . . . . | 1,252 ft. | 100 ft. |

*A Branch Dock* (called the "Gladstone Branch Dock, No. 2"), 1,285 ft. long and 400 ft. wide, also opening out of the vestibule dock, to the north of No. 1 Branch and having treble storey sheds on the north and south sides.

This latest system of docks is now nearing completion, and the estate will then comprise an area of nearly 2,500 acres, of which 654 acres are docks and basins, with a lineal quayage of 39 miles.

For the year ended July 1, 1923, the net tonnage of vessels entering and leaving the port amounted to 36,159,158 tons, and the Board's total revenue for that year amounted to £3,603,086.

It has been impossible in an abbreviated description of the port to deal with many of the facilities which go to make up the equipment of a great port, or with the works carried out by the Board to keep the approaches to the port itself in a thoroughly efficient condition.

### Landmarks and Buoys.

From a small beginning under the powers granted in 1708 to levy dues for the purpose of maintaining landmarks and buoys, the conservancy of the river has grown to its present vast proportions. At the present time, four lighthouses, viz.: Point Lynas, Ormeshead, North Wall, and the Rock, and four lightships, at the North West, Bar, Formby, and Crosby Stations, are maintained. Three of these lightships, the Bar, Formby and Crosby, are connected by wireless telephone with the head office of the Dock Board in Liverpool. The present Bar Lightship burns vapourised petroleum producing 40,000 candle-power, and is fitted with fog-horns and submarine bell.

Gas buoys were first provided for the Crosby Channel in 1888. At the present time there are 98 buoys in the Mersey channels, 44 acetylene, 16 gas, and 38 unlighted.

## Dredging the Fairway and Bar.

In 1890, two small self-propelled pump suction hopper barges were constructed, with a capacity of 400 tons, and were put to work on the bar, and by 1893 had improved the minimum depth in the centre of the channel from 11 ft. to 19 ft.

Other dredgers have since been built, the latest being the well-known Leviathan, with a hopper capacity of 180,000 cu. ft., and capable of filling herself with 10,000 tons of sand in 50 minutes from a maximum depth of 70 ft. No less than 750,000 tons of sand have been removed from the river and channels in a week by the dredgers belonging to the Board. The total amount of sand removed since dredging was first commenced until April 30, 1924, is 473,000,000 tons; this compares with the 393,668,000 tons of actual excavations removed in the construction of the Panama Canal. This sand is taken to sea and dumped clear of the channels. The least depth of water on the bar is now 25 ft. (L.W.O.S.T.)

## Liverpool Landing Stages.

The great landing stage at Liverpool is worthy of notice. Formerly it was in two parts, called the George's and Prince's Landing Stages, with an open length of water space between them. These were connected in 1874 by an intermediate stage about 500 ft. long.

It was in that year, a few days after the completed work had been thrown open to the public, that the entire structure was destroyed by fire.

At the present time, the total length of the Prince's and George's Landing Stages is 2,534 ft., connected with the shore by ten bridges and a floating roadway. There are also railway lines from the main lines of dock railway to a station on the Prince's Parade, so that passengers can be brought from the great trunk lines of the country to the liners without change of carriage.

Mechanical conveyors are provided for the transfer of passengers' luggage to and from the steamers and trains, with commodious waiting and baggage rooms for the use of passengers.

A sheltered upper deck runs almost the entire length of the Prince's Stage.

There are Berths at the stage at one time for two ocean liners, eight ferry steamers, and two coasting steamers.

The total number of passengers, including ferry passengers, using the Prince's and George's Stage amounted to 41,000,000 in the year 1923.

## Dock and Warehouse, etc., Facilities.

There are twenty-two graving docks on the dock estate and others in the port belonging to private firms, capable of meeting all demands made on Liverpool as a great ship-repairing centre.

The Board's warehouses have a large capacity, particularly for those goods which are not catered for by private interests; the Stanley Dock Tobacco Warehouse, the greatest warehouse under one roof in the world, is used exclusively for tobacco, and its fourteen floors, comprising a basement, quay, and twelve upper floors have an area of 36 acres.

Along the seven miles of frontage on the Liverpool side, just behind the dock road, are numerous great goods stations, connected by rail with the loading and discharging berths; and the same remarks apply to the Birkenhead docks on the Cheshire side of the river.

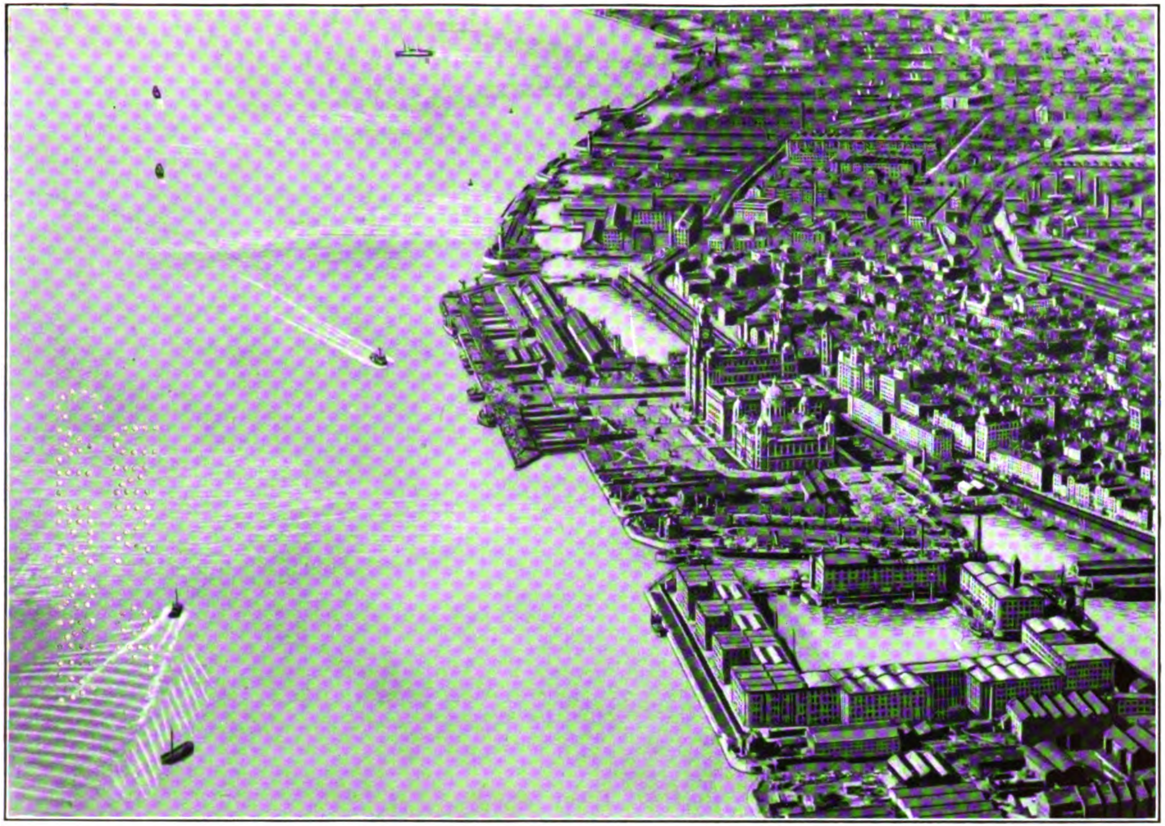
Special facilities exist for dealing with particular trades. Vessels carrying oil in bulk have the use of a jetty built for that purpose, which is connected by pipes with storage tanks of great capacity. The Board has provided five floating cranes, the largest with a capacity of 200 tons. The estate is well equipped with electric power and lighting, and the sheds with thoroughly up-to-date cranes.

On the Birkenhead side of the river is one of the largest lairages in the world, with accommodation for 6,800 cattle and 22,000 sheep and pigs and with every facility for the slaughtering of animals, the storage of meat and the forwarding of either livestock or meat by road or rail.

Easy access to all the docks on the Liverpool side of the river is provided by the Electric Overhead Railway, which follows the entire length of the line of docks.

## Liverpool in the Great War.

No account of Liverpool would be complete without some reference being made to the part played by the port during the years of the Great War. Owing to enemy action in the English Channel and the North Sea, a very large number of vessels was diverted from east coast ports to Liverpool, and this at a time when the number of transport workers available was greatly reduced, owing to the call to the Colours. In addition to the importation of supplies necessary for the normal consumption of the country, Liverpool became the great port of entry for diverted traffic of every description, as well as for vast quantities of munitions and war material. Over three-quarters of a million men arrived in Liverpool from overseas in one year, and troops were also continually passing outwards to every seat of war; the port, moreover, was a naval base, and the flow of His Majesty's ships in and out was constant.



(*Photo: Airco Aerials, Ltd.*)

BIRD'S-EYE VIEW OF CENTRAL SECTION OF DOCK ESTATE,
LIVERPOOL SIDE, LOOKING NORTHWARD.
1924.

## The Future of the Port.

It is always unwise to prophesy, but the future is contemplated with confidence by those responsible for carrying on the work so ably performed by their predecessors. So long as Britain maintains her position as a great industrial country, so long will this port be essential to meet the nation's needs. Evolved, originally, to satisfy the requirements of a small local population, Liverpool to-day serves a very large part of the kingdom, and especially the great northern and midland industrial centres, where the population depends so largely on importations of foodstuffs and raw materials from overseas, and the export of their manufactures.

The policy of the Board, throughout, has been to anticipate requirements rather than to meet these as they actually arise, the result being that Liverpool has always been in the forefront as a port and able to meet such abnormal demands as those which were made, for instance, during the Great War.

T. Rome.

# CHAPTER XIV.

## THE WORSHIPFUL COMPANY OF SHIPWRIGHTS: ITS HISTORY AND WORK.

As the annals of the City of London form, perhaps, the most striking chapter in the history of England, so is the part played by the City's Companies or Guilds one of the strongest factors in the growth of London's wealth and status as the capital of the British Empire. The development of the City's commerce and liberties was due in a large measure to the Companies. In the Middle Ages they were all-powerful in the government of the crafts and trades they represented, and now they justify their continued existence not only by fostering technical education and encouraging the arts, but by their benevolence and hospitality. No Company is worthier of its traditions than the Shipwrights' which was a recognized London brotherhood in 1260 (as having probably existed from the beginning of the reign of Richard I.), and is now so much to the fore in the training of craftsmen.

The word "shipwright" in Old English meant an artificer employed in the construction of ships, whether large sea-going vessels or small craft, and who was skilled in navigation; and it was used in that sense in the time of St. Edward the King and Confessor, when *nauicularius* (a ship-owner or ship-master who conveyed passengers and goods for hire) instead of *naupegus* (a ship-builder or ship-carpenter) was the Latin equivalent of the English "scipwyrhta."* "Thomas the Shipwright" is mentioned in a Coram Rege Roll of 1297, and the records of the Chamber of London show that John Stockfleete, shipwright, citizen of London, took an apprentice, in 1387.

To the dignity of a "time immemorial" existence for the Mystery of Shipwrights, may be added a traditional exactitude in workmanship, for a fourteenth-century romance gives "Hit denned so ryght, As on nayl doth theo schipwryght." (*King Alisaunder*, line 3665, in *Metrical Romances of the* 13*th*, 14*th and* 15*th Centuries:* published from Ancient MSS. . . . by HENRY WEBER, 1810, vol. i. p. 152).

### FOUNDATION OF THE COMPANY.

The Mystery of Shipwrights in 1456 formed themselves into a fraternity in the worship of SS. Simon and Jude, the patrons of

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* *Ælfric's Glossary* in *Anglo-Saxon and Old English Vocabularies*, by THOMAS WRIGHT, 2nd edition, edited and collated by RICHARD PAUL WÜLCKER, 1884 vol. i. p. 112.

THE RIGHT HON. THE VISCOUNT INCHCAPE, G.C.M.G., G.C.S.I., K.C.I.E.
MASTER OF THE WORSHIPFUL COMPANY OF SHIPWRIGHTS.

shipwrights—whose feast is celebrated on October 28th—for the brethren artificers and the sistern consisting of wives or widows of the artificers. They prepared ordinances, providing for "quarterly potations in nourishing of love," the formation of separate common and charity funds, the control of apprentices, the care of the brethren's livery hoods, testamentary bequests for prayers, enforced submission of trade disputes to the arbitration of the two joint masters of the Mystery and other matters for the well-governing of the fraternity and craft. The members at first carried on their work in their yards adjoining the River Thames within the City and Suburbs of London, but, later, were constrained to remove to Ratcliff and Wapping. This mystery and fraternity became the corporation existing by prescriptive right which is now commonly known as the Worshipful Company of Shipwrights, but whose full style is "The Master, Wardens, Assistants and Commonalty of the ancient Fraternity or Brotherhood of Free Shipwrights of London." It was by that corporate style that the Company obtained from the Lord Mayor and Court of Aldermen, in 1920, a confirmation and ratification under the seal of the Office of Mayoralty of its acts, ordinances, by-laws, and constitutions, as it had done exactly 300 years before.

## Officers and Membership of the Company.

The government of the Company is vested in its Court, consisting of a Master, four Wardens (known as the First, Second, Third and Fourth Warden, respectively) and twenty-five Assistants (of whom eleven are now Past Masters) who meet four times a year for the transaction of business. The present Master is the Right Hon. the Viscount Inchcape, G.C.M.G., G.C.S.I., K.C.I.E., and the Wardens are Sir Kenneth Skelton Anderson, Bt., K.C.M.G.; Sir Eustace Henry Tennyson D'Eyncourt, K.C.B., F.R.S., D.Sc.; the Right Hon. Walter Runciman, P.C., LL.D.; and Mr. Francis Thomas Talbot. The Treasurer is Sir Charles Edward Ellis, G.B.E., K.C.B. (Past Master). The officers consist of the Clerk, Hon. Chaplain, Marine Painter, and Hon. Historian and Librarian. By arrangement with the Worshipful Company of Barbers, the address of the Shipwrights' Company is Barbers' Hall, Monkwell Street, E.C.2.

Although, as in the case of several other Companies, the selected freemen wore a livery from quite early times, it was not until 1782 that the Court of Aldermen made the Shipwrights' a Livery Company, which privilege was extended in 1830 and again in 1920. There are at present, including the Court of Assistants, one hundred and ninety liverymen whose privileges include: (1) the municipal vote for Lord Mayor, Sheriffs and other officers; (2) an alternative parliamentary vote, if in business in the City; (3) eligibility for election (if otherwise qualified) as Member of the Court of Assistants, as Sheriff and as Alderman. The Freedom of the Company may be obtained (1) by "presentation," either for public services or for distinguished service to the Company either as a guild or in the development of ship-building; (2) by "servitude," after not less than four years' apprenticeship to a freeman; (3) by "patrimony," if the applicant was born after the father's freedom; or (4) by "redemption" or purchase. In addition to the 190 liverymen, there are 76 freemen including 9 ladies. Each freeman is entitled to take up the freedom of the City of London and become "Citizen and Shipwright of London." The citizen may take an apprentice, and the indentures, prepared by the Clerk, should be enrolled in the Chamber of London. This total of 266 freemen compares unfavourably with a roll of 579 in 1681.

The Shipwrights' Company possesses, in addition to its valuable records and its collection of plate, insignia, books and banners, several objects of especial interest relating to its craft, *e.g.* a model of four prows bolted together made by James Johnson, apprentice in 1831, a fragment of the "James Watt" pioneer steamship (made into a snuff-box), trophies won by Henry Chapman in the Royal Thames National Regattas of 1843 and 1845, and models of a sailing ship and steamship which won first prizes at the Company's Competitive Exhibition of models and designs in 1877.

## The "Foreign Shipwrights."

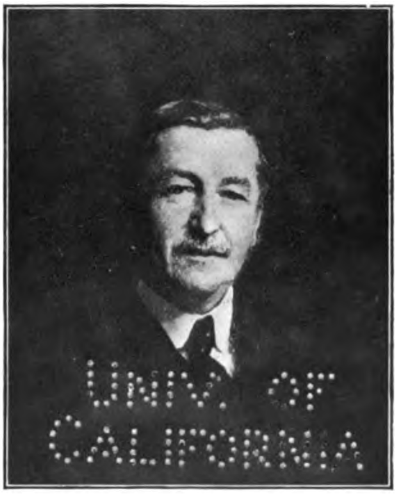
The Worshipful Company is the sole London guild representing the shipwright's craft, but one must occasionally refer to its old-time rival, now extinct, "The Master, Wardens and Commonalty of the Art or Mystery of Shipwrights of England," afterwards "The Master, Wardens and Commonalty of the Art or Mystery of Shipwrights of Redrith [*Rotherhithe*], in the County of Surrey," and known to the citizens of London as the "Foreign Shipwrights' Company" ("foreign" as being outside the City's jurisdiction). It is important to do so because, in scores of text-books and books of reference, from Stow's *Survey of London* downwards, there is utter confusion between the two Companies.

Peter Pett of Deptford, Matthew Baker and the other Master Shipwrights of the Navy Royal, petitioned Queen Elizabeth in 1578 for a corporation within the liberty of the Thames and other places near adjoining: in 1592 a brief for a patent was granted, but nothing further was done until April 22nd, 1605, when King James I., on the recommendation of the High Admiral of England, the Captain-General of the Navy Royal and the principal officers of the Navy, incorporated all shipwrights and carpenters using the art or mystery of building and making of ships within England and Wales. Further letters patent were granted to this Company in April 1612, incorporating all and every person and persons being shipwrights, caulkers, or ship-carpenters, or in any sort using, exercising, practising or professing the art, trade, skill or mystery of building, making, trimming, dressing, graving, launching, winding, drawing, stocking or repairing of ships, caravels, hoys, pinnaces, crayers, ketches, lighters, boats, barges, wherries or any other vessel or vessels whatsoever, used for navigation, fishing, or transportation within or about the Realm of England or Dominion or Wales, or of making, trimming or repairing of masts, tops, pulleys, pumps for

PROF. SIR JOHN H. BILES, K.C.I.E., LL.D., D.SC., PAST MASTER.

CAPT. J. BELL WHITE, C.B.E., R.N.R., J.P., PAST MASTER.

SIR ARCHIBALD DENNY, BART., LL.D., PAST MASTER.



UNIV. OF CALIFORNIA

SIR CHARLES E. ELLIS, G.B.E., K.C.B., PAST MASTER.

PAST MASTERS OF THE WORSHIPFUL COMPANY OF SHIPWRIGHTS.

ships, oars or other instruments or appurtenances of wood thereunto belonging, or any other carpentry work whatsoever belonging to or used, occupied or employed in or about any ships, pinnaces or other vessel or vessels above-mentioned, or in any sort appertaining to shipping, sailing, rowing, stocking, launching or navigation.

## RIVALRY OF THE COMPANIES.

The Foreign Shipwrights' Company, which carried on its business at Shipwrights' Hall, Wapping, strove continuously over a long series of years, but without any real measure of success, to bring the Worshipful Company of Shipwrights under the jurisdiction of its charter of 1612, and this persecution involved both Companies in costly legal proceedings. At length, at a meeting of the Privy Council, March 18th, 1684–5, Sir Robert Sawyer, the Attorney-General, made the following report to King James II. :—

> May it please your Majesty.
>
> I have heard the matters in difference between the Corporation of Shipwrights of Redrith and the Free Shipwrights of London by their Counsel, and cannot find that the Free Shipwrights of London have anyways misbehaved themselves by invading any of the rights of the New Company. I find there were former differences between them which were settled by an Order in Council in 1638, whereby the Free Shipwrights of London were declared to be clearly and absolutely exempted from the rule and government of the New Corporation, they have been an ancient Fraternity time out of mind, and cannot see it will anyways contribute to His Majesty's service to make any variation from that Order in Council, but to leave them under the distinct rules of government whereby they have for a long time been well governed.

The King having taken this report into his consideration was pleased to approve thereof, and ordered all persons whom it might concern to take notice and conform themselves accordingly. This was done with the concurrence of the twenty-two privy councillors present.

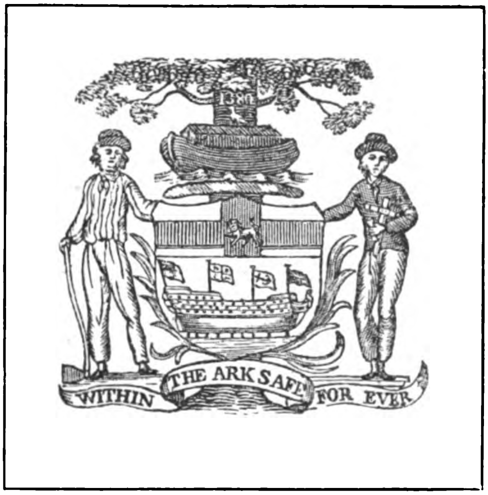
## EXTINCTION OF THE "FOREIGN SHIPWRIGHTS."

This decision proved to be the death-blow of the Foreign Shipwrights. They made a final rally and petitioned for a new charter. The application came before Samuel Pepys, as Secretary for the Affairs of the Admiralty, and he advised them first to surrender their 1612 charter, which they did on October 24th, 1684, when the letters patent were at once defaced in the usual way, by cutting a deep indent out of the folded vellum which caused a lozenge-shaped hiatus in the charter. The cancelled document was lodged with the Corporation of Trinity House. Their petition which asked for control of the Free Shipwrights was opposed by the latter, claiming jurisdiction over the Thames, and by the town of Newcastle, claiming Admiralty jurisdiction over the Tyne. Both Pepys and Trinity House supported it, but this was a disadvantage, for these sponsors were out of favour at the accession of William and Mary, and the petition was disallowed in 1688.

In 1705, the unsuccessful petitioners, described as "The Master Shipwrights of England," represented to the House of Lords that they had not been in a regular method, many years past, to rectify the disorders amongst the shipwrights and to improve their trade; and prayed that leave be given to bring in a Bill of regulating clauses to be inserted in a new charter for the better breeding of shipwrights, and for the more firm and well building of ships and other vessels. The petition had the support of the Commissioners of the Admiralty, the Commissioners of the Navy, the Corporation of Trinity House and Prince George of Denmark, Lord High Admiral of England; but a motion in the House of Lords to refer the matter to a committee was lost, and all proceedings were finally abandoned. That was the end of the "Foreign Shipwrights."

## THE COMPANY'S ARMORIAL BEARINGS.

Nine months after the "Foreign Shipwrights" had been incorporated as the Company of Shipwrights of England, they applied to William Camden, Clarenceux King of Arms, the distinguished antiquary, to devise and assign unto them arms to be used in their common seal and otherwise as other corporations and societies had. Accordingly, by letters patent of January 9th, 1605–6, the following armorial bearings were devised, assigned and exemplified to the Company:—


WITHIN THE ARK SAFE FOR EVER

**Arms**: The field azure, in a sea the hull of a ship or, on a chief argent, a cross gules charged with a lion passant guardant or.

**Crest**: Upon a helm a wreath or and azure, on an ark sable, resting upon a mount vert, a dove bearing an olive branch proper.

The ship's hull and the sea are indicative of the shipwright's craft, and were devised in compliance with an Earl Marshal's warrant of the time of King Henry VIII., which directed the Kings of Arms that tokens of arms for the Crafts and Companies of the noble City of London should be so devised that it should appear by the same what craft and occupation they be of. The Cross of St. George and the Lion of England on the upper part of the shield are honourable emblems to indicate the national importance of the Shipwrights of England and their royal foundation.

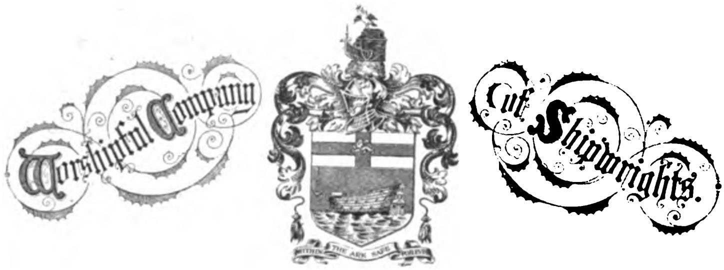
The Crest has reference, of course, to the successful completion of the work of Noah the shipwright, and is illustrative of Genesis viii. verses 4, 10 and 11.

> And the ark rested in the seventh month, on the seventeenth day of the month, upon the mountains of Ararat.
>
> . . . . . . . . . . .
>
> And he stayed yet another seven days; and again he sent forth the dove out of the ark;
>
> And the dove came in to him in the evening; and, lo, in her mouth was an olive leaf pluckt off; so Noah knew that the waters were abated from off the earth.

The right to the Arms and Crest so granted to the Shipwrights of England, and afterwards borne by their successors the Shipwrights of Rotherhithe, having entirely lapsed, they were adopted, together with the motto "Within the ark safe for ever," by the Worshipful Company of Shipwrights in, or about, 1784.

### Royal Warrant to the Company.

His present Majesty, by warrant under his Royal signet and sign manual dated March 2nd, 1920, after reciting that the attempt of the Foreign Shipwrights to obtain a new Charter was unsuccessful, chiefly owing to the opposition of the existing Company, and that the latter was never affected by the charters of 1605 and 1612, as is clearly evidenced by the Orders of the Privy Council of 1638 and 1685, was graciously pleased to give and grant to the Worshipful Company of Shipwrights his Royal Licence and authority, directed to the Deputy Earl Marshal of England, that they and their successors might bear the said Arms, Crest and Motto, in their common seal, shields, targets, pennons, buildings, utensils or otherwise, according to the laws of arms, the same being first duly exemplified and recorded in the College of Arms. The Royal warrant in referring to the Company, states that, after existing as a mystery, fraternity or brotherhood of shipwrights for 150 years, it was in the reign of Henry IV. recognized as a Company by the Lord Mayor, Aldermen and Citizens of London, under the constitutional powers conferred upon the Barons of the City of London by charter of the 16th year of King John.



The Deputy Earl Marshal of England issued his warrant to the

Kings of Arms on April 6th, 1920, and the exemplification and record were made on June 24th following. The laws of arms required the introduction of marks of difference in the Arms and Crest, but these only increased the historical interest of the composition, because a golden sword of St. Paul, the patron saint of the City of London, was placed in the dexter chief point (left-hand top corner) of the shield and in the prow of the ark in the crest.

### THE "FREE SHIPWRIGHTS" AND THE CITY.

Within the last few years, elaborate searches have been made in public and private records in connection with the history of the two Shipwrights' Companies, and much interesting matter has been collected bearing on the growth and development of the craft of ship-building, but one is only able, within the limits of this Chapter, to give a short summary of the more interesting items.

At first, it was found possible for the Thames shipwrights to belong to both the rival Companies and, between 1616 and 1663, at least twenty "citizens and shipwrights" joined the Foreign Shipwrights. In the lawsuits which lasted for seventy years, the Free Shipwrights always had the support of the Lord Mayor and Aldermen and the services of the Recorder of London as their counsel, but many hundreds of pounds were spent in protecting their rights. Sir Henry Marten, the Admiralty Judge, reported in 1637 :—

> . . . because I perceive that these London Shipwrights, being supported by the countenance of the City, will by no means agree (whatsoever I shall say or do) to come under the King's charter and government ; and to that purpose are resolved to opposo themselves, by further proceedings at law.

The Free Shipwrights, even after the extinction of the Foreign Shipwrights, were not satisfied with their legal status as a corporation existing by prescriptive right and continually sought for the record of a charter which they thought might at one time have been granted to them ; and, failing that, they contemplated petitioning for a charter or Act of Parliament ; for instance, in 1651, 1728 and 1777 they employed counsel to search for any record, and to draft petitions (which were never lodged). The Wardens, in 1782, made searches in the Petty Bag Office, the Rolls Chapel and the Record Office at the Tower of London, but they only discovered the 1605 charter and not that of 1612. They had conferences with the Chamberlain, Town Clerk, Common Serjeant, Recorder, Aldermen, the City Members of Parliament, the Officers of the Court of Aldermen and the Lord Mayor's Attorney, and the costs amounted to close on £320.

Although the Crown was usually against them in their fight, the Free Shipwrights played their part as loyal citizens by presenting addresses and contributing to the cost of decorating the City at the coronations of King Charles II. and King James II. The Foreign Shipwrights, with the support of the Lord High Admiral, resisted impressment whether as seamen or for land service, and liability to service on juries on five different occasions between 1641 and 1673, but the Free Shipwrights took their part in those duties and only once petitioned, and that in the first year of the Commonwealth, for freedom from bearing arms.

## The Company's Control of the Craft.

Both Companies of Shipwrights attached considerable importance to the selection of well-seasoned timber for their work. The City company made various regulations, including provisions for searching the yards, between 1553 and 1593, and the supervision was never abandoned as long as the Company controlled the trade. The earliest record in the State Papers of a similar search by the Foreign Shipwrights is dated 1630. In the Pepysian Library at Magdalene College, Cambridge, is the manuscript of " A Bill for preservation and increase of timber " drafted at the instance of Samuel Pepys by his friend Freeman, with the concurrence of the Foreign Shipwrights, in 1675.

It has already been explained that the extinct Company was called " foreign " as being outside the City's control, and because its members were non-freemen. In the Bodleian Library at Oxford is " A description of unfree shipwrights and calkers, with some observations concerning surveyes," prepared about 1688. On January 26th, 1688–9, the Lord Mayor and Court of Aldermen of London made an order respecting the employment of non-freemen by the Worshipful Company of Carpenters. The last attempt of the Shipwrights' Company to preserve monopoly of the trade was in 1808, when it obtained an Act of Common Council enacting that all shipwrights in the City should become free of the Company.

The control of the apprentices of " citizens and shipwrights," as well as of their journeymen, was exercised by the Free Shipwrights under their ordinances and by the City Chamberlain, as representing the Court of Aldermen, and such control of the apprentices is still effective, although—owing to the restrictions on apprenticeship imposed by the Trade Unions—the numbers have considerably decreased. Apprentices were taken by members of the Company from the earliest time, although the existing series of records of the actual bindings only extends back to the latter part of King Charles I.'s reign. As Rotherhithe was not a corporate town, the enrolment of apprenticeship indentures had often been made void by statute of 5 Elizabeth, chapter 5, section 12; so the Foreign Shipwrights not having recourse to the excellent disciplinary measures of the Chamber of London, nor to any similar control, in the care of their apprentices, were obliged to seek redress from a higher, though probably less effective, source. A Privy Council order was issued in 1613, that persons using the art and mystery of shipbuilding contrary to the charter, and journeymen or apprentices of shipwrights unlawfully departing from their masters, might be apprehended and brought before the Master and Wardens of that Company and, if necessary, before the Lord High Admiral.

Just before the surrender of their charter, the Foreign Shipwrights were obliged to contribute tonnage dues for the relief of their decayed members :—

On every newly-built vessel of more than 100 tons, 5*s.* 6*d.* per ton ;
On every vessel less than 100 tons, 3*d.* per ton ;
On every new wherry, 4*d.* per ton ;
For old work repaired, 12*d.* a pound ;

while the Free Shipwrights licensed their members to build and repair ships and other vessels in the River Thames from Staines Bridge to the River Medway on payment of quarterage and without any liability to the tonnage.

### LABOUR CONDITIONS IN THE SEVENTEENTH CENTURY.

In the seventeenth century, the journeymen's working hours were, from the middle of March to the middle of September, 5.30 a.m. to 6.30 p.m. ; and, from the middle of September to the middle of March, " from spring of the day in the morning until night of the same day " ; in each case less the times appointed for eating. The fines were :—

| | |
|---|---|
| For every hour's wilful absence .. .. .. .. .. .. | 4*d.* |
| For every hour's negligence .. .. .. .. .. .. | 2*d.* |
| For not continuing at work until the work be finished .. .. .. | 40*s.* |

A virtuous craftsman would thus work for some seventy-two hours a week (for a " half-day off " on Saturdays was unknown then) ; the wages are not set out in the same schedule as the fines. The remuneration of His Majesty's Master Shipwrights in the Navy was then 6*s.* 8*d.* a day.

In a report to Pepys from Trinity House on December 6th, 1687, " The Master, Wardens and Assistants of the Guild and Fraternity of the most glorious and undivided Trinity and of Saint Clement in the Parish of Deptford Strond in the County of Kent," were " of the opinion that it is for the service of His Majesty and the Public to have but one Company of Shipwrights, and that all of that trade in England and Wales ought to be under their rule and government."

### THE COMPANY'S PART IN TECHNICAL EDUCATION.

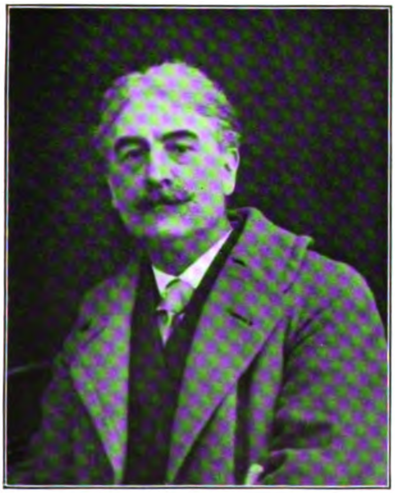
The Worshipful Company of Shipwrights, having ceased to exercise any legal or punitive supervision of the craft, have consistently endeavoured for the past forty-eight years to foster it by technical education schemes, exhibitions and rewards and grants for models, designs and the general advancement of the art.

On April 19th, 1899, " The Shipwrights' Company Educational Trust Fund " was constituted with the sanction of the Company and the assistance of members thereof and of other persons interested in ship-building and ship-owning, for the purpose of promoting the education of necessitous youths engaged in the ship-building trades ; and further contributions or payments to such Trust Fund have been received and are still invited.

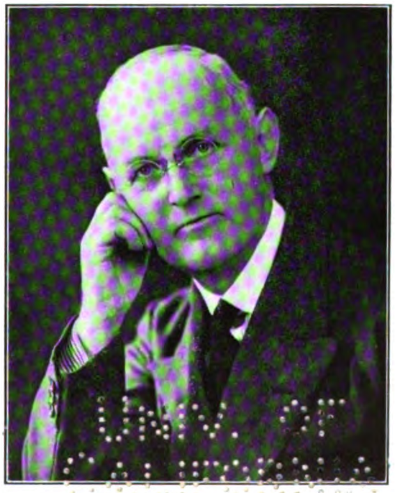
A special Committee was appointed to administer the Fund, and it was arranged that the Director of Naval Construction at the

F. C. LINGARD, CLERK.

REV. A. R. CLEMENS, HONORARY CHAPLAIN.



BERNARD F. GRIBBLE, MARINE PAINTER.



UNIV. OF CALIFORNIA

ARCHIBALD HURD, HONORARY HISTORIAN AND LIBRARIAN.

OFFICERS OF THE WORSHIPFUL COMPANY OF SHIPWRIGHTS.

Admiralty and the Chief Ship Surveyor of Lloyd's Register of British and Foreign Shipping should be *ex-officio* members, in order to give a representative character to the Committee. The remaining members were selected from the Shipwrights' Company, and have always included eminent representatives of ship-building and ship-owning. The scheme has now been in continuous operation for over twenty-seven years. The dividends received from the Trust Fund have been distributed each year in the form of scholarships, exhibitions and prizes. From time to time, scholarships to the value of £50 a year have been placed at the disposal of the Committee by the Fishmongers' and Skinners' Companies. These have been voted to students attending classes in naval architecture at Glasgow University, Armstrong College, Newcastle-on-Tyne; Liverpool University and the Department of Science and Art, and also to private students at the Royal Naval College, Greenwich, who have taken the same classes as the students of the Royal Corps of Naval Constructors. Substantial assistance has thus been given to a number of young men whose private means would not have enabled them to take the higher training in their profession, but whose previous career, chiefly at evening classes supported by the Shipwrights' Company, had shown them to be capable of deriving benefit from the higher training. The amounts granted to classes in particular localities are small, but have proved to be of great value to young men of the working classes, enabling them to purchase books and mathematical instruments, or to obtain instruction which otherwise would not be possible for them.

Reviewing the work done by the Committee, it may be said that many hundreds of young men in the Metropolitan district and in the great centres of ship-building, who would otherwise have been without the means of instruction in the science of ship-building, have been helped by the operation of this modest, but carefully administered, Fund and have been able to obtain efficient instruction.

### Offer of Grants and Certificates.

The Educational Trust Fund Committee has decided to encourage the study of Naval Architecture only if in connection with study of cognate subjects, such as mechanics, higher mathematics and physics, so as to ensure a general scientific education. With this object they are prepared to offer grants and certificates at institutions which provide such group courses as can be recognized by the Worshipful Company. The Committee is presenting these different certificates so that a Junior Certificate may be awarded to the Shipyard Trade Apprentices and a Senior Certificate to Shipyard Drawing Office Apprentices and others equivalent thereto, likely to be engaged in directional work in the shipyard.

The Committee offers a grant of £2 for each Naval Architecture Class forming part of a group course at a recognized institution. These grants can be applied in any manner which seems best to the authorities of the institution; the Committee, however, suggests that only prizes of books or instruments should be given.

The Committee offers a Junior Certificate to each student who shall complete, to the satisfaction of the institution authorities, a three-years' group course as above defined.

The Committee offers a Senior Certificate to each student who shall complete to the satisfaction of the institution authorities a group course of five years or more.

Students who have obtained a Junior Certificate are eligible for a Senior Certificate on completing the Senior course, and after July 1926, it will be obligatory on the winners of a Senior Certificate to have obtained previously a Junior Certificate.

Any further information as to these technical education schemes can readily be obtained from the Clerk, Mr. F. C. Lingard, M.A., 4, New London Street, London, E.C.3.

### SCHEME FOR NATIONAL TRAINING.

It may be added that the Company is engaged in formulating. jointly with the Board of Education and the Institution of Naval Architects, a scheme for the national training of shipwrights and shipwrights' apprentices, which scheme, if carried through, will supersede the present scheme so far as the grant of certificates is concerned.

The information contained in this article has been derived from the Company's archives, records in the Public Record Office, Admiralty, Privy Council Office, College of Arms, Town Clerk's Office and Trinity House; and from manuscripts in the British Museum, Bodleian Library at Oxford, the Pepysian Library at Cambridge and other original sources.

ERNEST A. EBBLEWHITE.

# PROFILES OF
# BRITISH AND FOREIGN WARSHIPS
# AND MERCHANT SHIPS

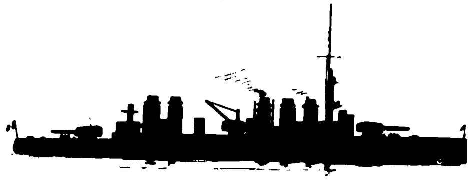
[In order to facilitate identification, the ships are arranged in accordance with the number of funnels and masts, as these are the features most easily distinguished at a distance. The page indicated, in the case of warships, refers the reader to the table where full particulars of the ships will be found. All the profiles are drawn to the scale $\frac{1}{3}$ in. = 100 ft.]

[Indexes to the names of vessels of which profiles are included in this section are given at the end of the volume.]

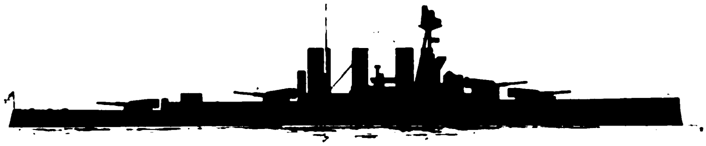
# CAPITAL SHIPS.

[In order to facilitate identification, the ships are arranged in accordance with the number of funnels and masts, as these are the features most easily distinguished at a distance. The page indicated, in the case of warships, refers the reader to the table where full particulars of the ships will be found. All the profiles are drawn to the scale $\frac{1}{2}$ in. = 100 ft.]

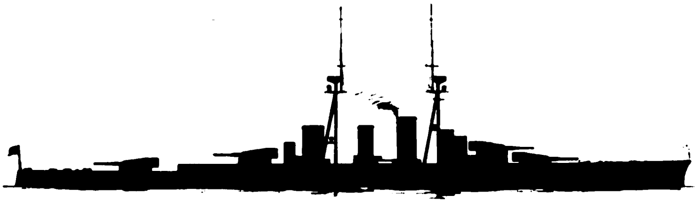
[Indexes to the names of vessels of which profiles are included in this section are given at the end of the volume.]



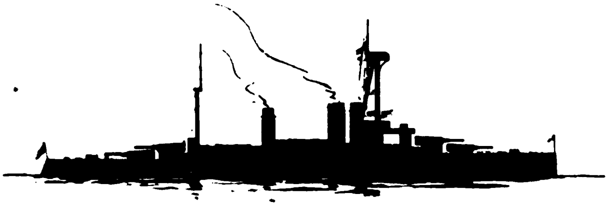
**FRANCE. Battleships. Condorcet. Diderot.** (See p. 390.)



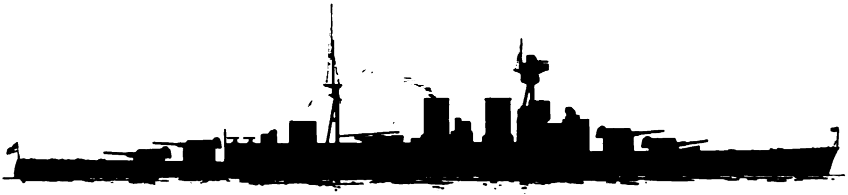
**GREAT BRITAIN. Battle-cruiser. Tiger.** (See p. 384.)



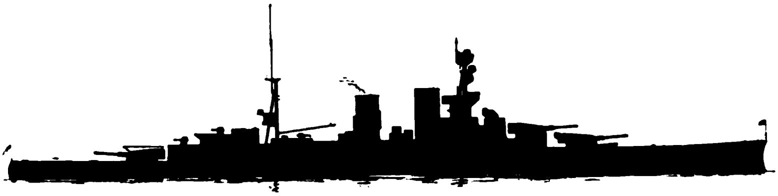
**JAPAN. Battle-cruisers. Haruna, Hiyei, Kongo, Kirishima.** (See pp. 404 and 405.)



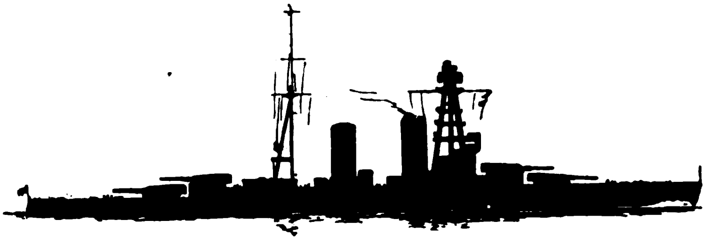
**FRANCE. Battleships. Courbet, Jean Bart, Paris.** (See pp. 396 and 397.)



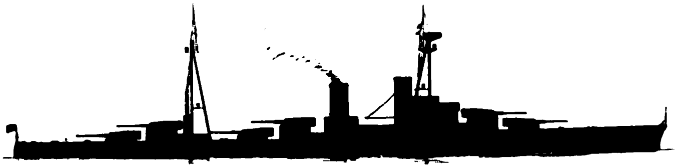
**GREAT BRITAIN.** **Battle-cruiser.** **Hood.** (See p. 382.)



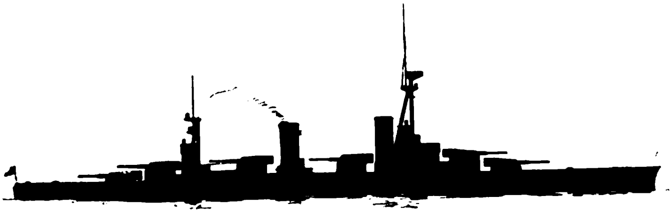
**GREAT BRITAIN.** **Battle-cruisers.** **Renown, Repulse.** (See p. 383.)



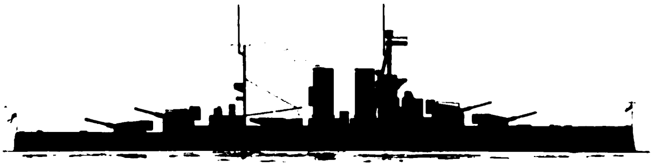
**JAPAN.** **Battleships.** **Mutsu, Nagato.** (See p. 405.)



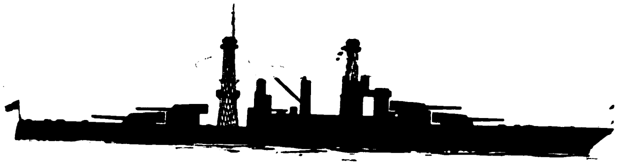
**JAPAN.** **Battleships.** **Hyuga, Ise.** (See p. 404.)



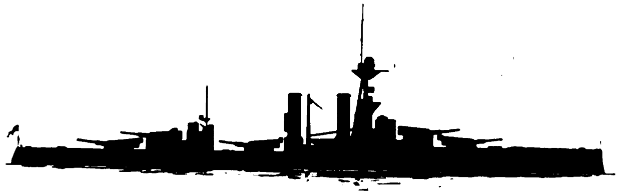
**JAPAN.** **Battleships.** **Fuso, Yamishiro.** (See pp. 404 and 405.)



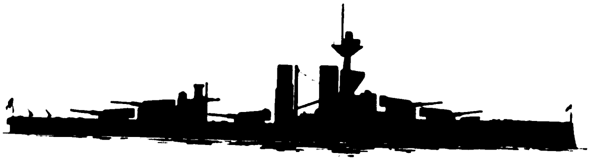
**GREAT BRITAIN.** **Battleships.** **Barham, Malaya, Queen Elizabeth, Valiant, Warspite.**
(See pp. 383, 383, and 384.)



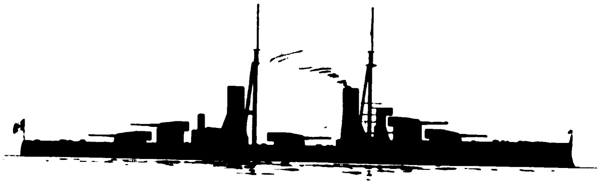
UNITED STATES. Battleships. California, Tennessee, Colorado, Maryland, West Virginia. (See pp. 414, 415, and 417.)



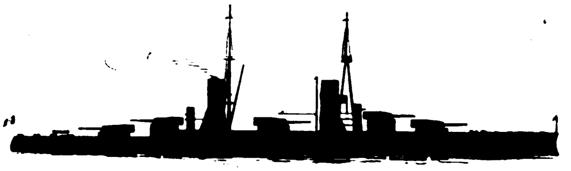
GREAT BRITAIN. Battleships. Benbow, Emperor of India, Iron Duke, Marlborough. (See pp. 382 and 383.)



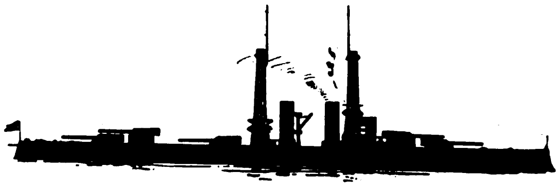
GREAT BRITAIN. Battleships. Centurion, King George V. (See p. 382.)



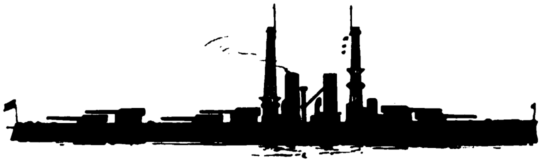
ITALY. Battleships. Andrea Doria, Caio Duilio. (See p. 401.)



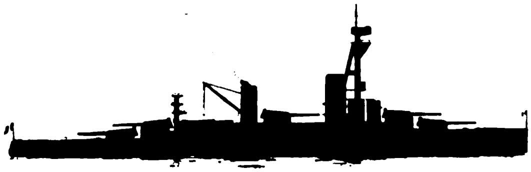
ITALY. Battleships. Conte Di Cavour, Giulio Cesare. (See p. 401.)



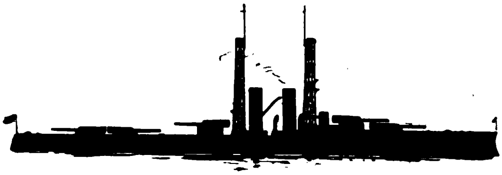
UNITED STATES. Battleships. New York, Texas. (See pp. 416 and 417.)



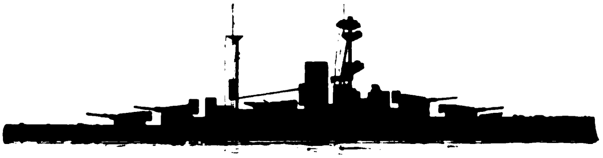
**UNITED STATES. Battleships. Arkansas, Wyoming.** (See pp. 414 and 417.)



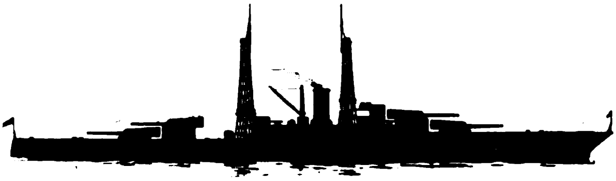
**FRANCE. Battleships. Bretagne, Lorraine, Provence.** (See pp. 396 and 397.)



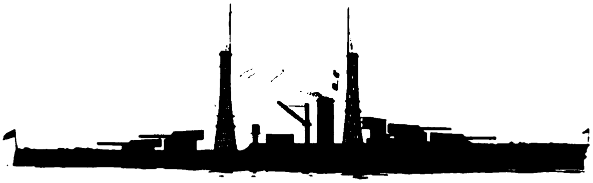
**UNITED STATES. Battleships. Florida, Utah.** (See pp. 415 and 417.)



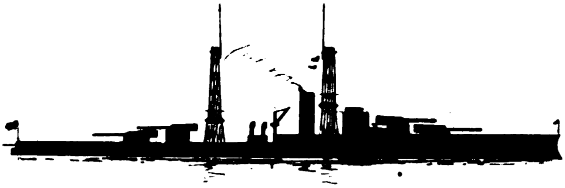
**GREAT BRITAIN. Battleships. Ramillies, Resolution, Revenge, Royal Oak, Royal Sovereign.** (See p. 383.)



**UNITED STATES. Battleships. Idaho, Mississippi, New Mexico.** (See pp. 415 and 416.)

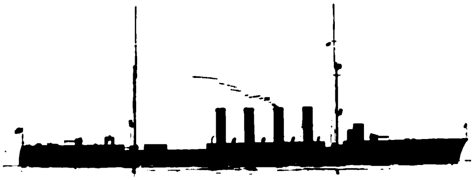


**UNITED STATES. Battleships. Arizona, Pennsylvania.** (See pp. 414 and 416.)

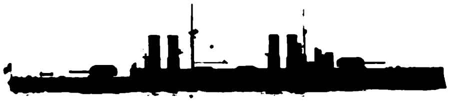


**UNITED STATES. Battleships. Nevada, Oklahoma.** (See p. 416.)

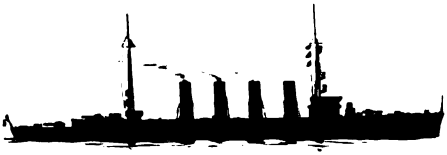
# CRUISERS.



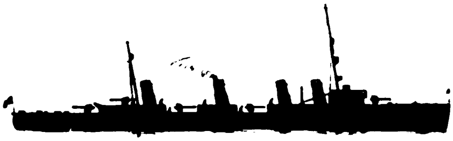
**JAPAN. Cruisers. Chikuma, Hirado, Yahagi.** (See pp. 406 and 407 )



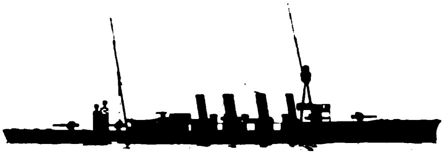
**ITALY. Cruisers. San Giorgio, San Marco.** (See p. 401.)



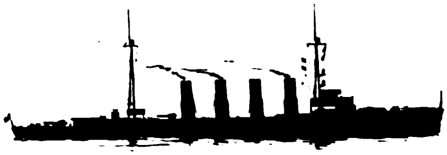
**FRANCE. Light Cruiser. Mulhouse** (*ex-German* **Stralsund**). (See p. 398.)



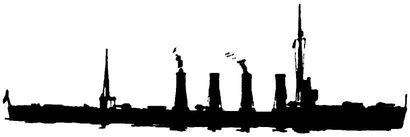
**ITALY. Scout Cruisers. Marsala, Nino Bixio.** (See pp. 402 and 403.)



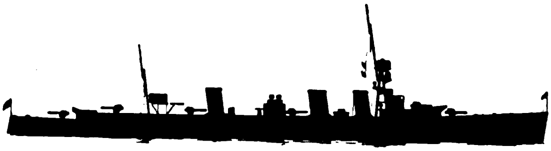
**GREAT BRITAIN. Light Cruisers. Birmingham, Dublin, Lowestoft, Southampton.** (See pp. 385, 388, and 389.)



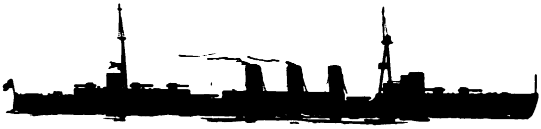
**ITALY. Light Cruiser. Taranto** (*ex-German* **Strassburg**). (See p. 403.)



**FRANCE.** Light Cruiser. Thionville (*ex-Austrian* Novara). (See p. 398.)

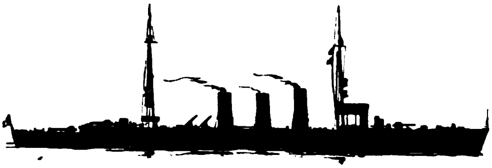


**GREAT BRITAIN.** Light Cruisers. Emerald, Enterprise. (See p. 388.)

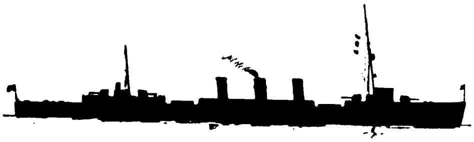


**JAPAN.** Light Cruisers. Kiso, Kitakami, Kuma, Oh-I, Tama.
* Abukama, Isudzu, Jintsu, Kinu, Natori, Nagara, Sendai, Yura.
(See pp. 406, 407.)

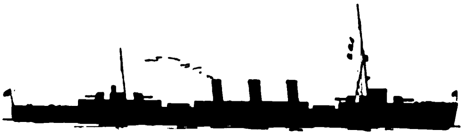
* Slightly different bridge to above. Has aircraft hangar incorporated in bridge structure.



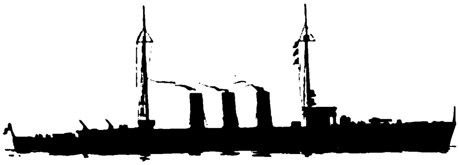
**FRANCE.** Light Cruiser. Metz (*ex-German* Königsberg). (See p. 398.)



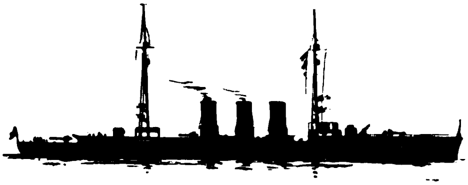
**JAPAN.** Light Cruisers. Tatsuta, Tenryu. (See p. 407.)



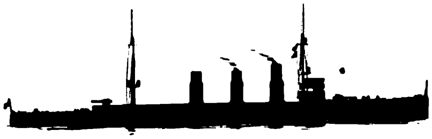
**JAPAN.** Armoured Cruiser. Kuma. (See p. 406.)



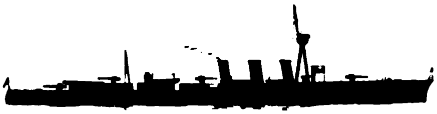
**FRANCE.** **Light Cruiser.** **Strasbourg** (*ex-German* **Regensburg**). (See p. 398.)



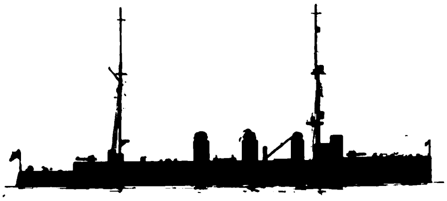
**ITALY.** **Light Cruiser.** **Ancona** (*ex-German* **Graudenz**). (See p. 402.)



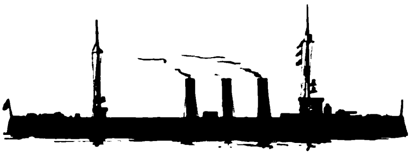
**ITALY.** **Light Cruiser.** **Bari** (*ex-German* **Pillau**). (See p. 402.)



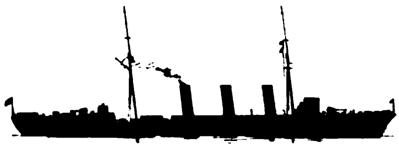
**GREAT BRITAIN.** **Light Cruiser.** **Cleopatra.** (See p 386.)



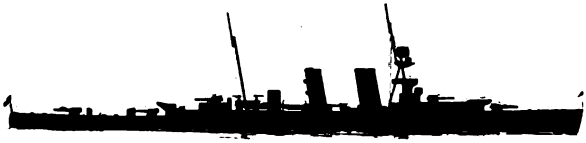
**ITALY.** **Scout Cruiser.** **Quarto.** (See p. 403.)



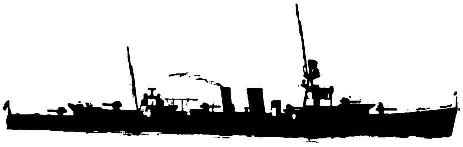
**FRANCE.** **Light Cruiser.** **Colmar** (*ex-German* **Kolberg**). (See p. 398.)



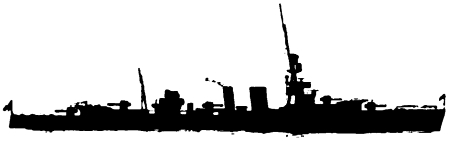
**JAPAN.** **Second Class Cruiser.** **Tone.** (See p. 407.)



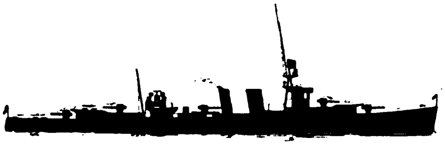
**GREAT BRITAIN.** **Light Cruisers.** **Effingham, Frobisher, Hawkins, Vindictive.** (See pp. 388 and 389.)



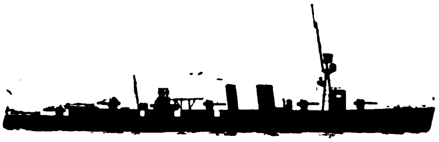
**GREAT BRITAIN.** **Light Cruisers.** **Danae, Dauntless, Delhi, Dunedin, Dragon, Durban.** (See pp. 387 and 388.)



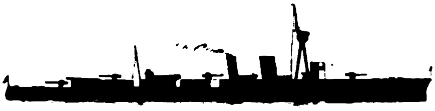
**GREAT BRITAIN.** **Light Cruisers.** **Cardiff, Ceres, Coventry, Curacoa, Curlew.** (See p. 387.)



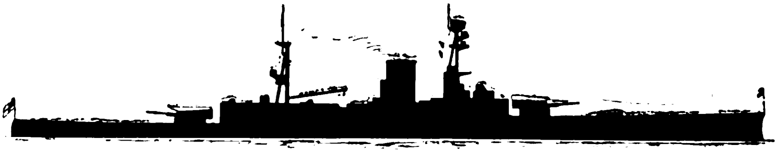
**GREAT BRITAIN.** **Light Cruisers.** **Cairo, Calcutta, Cape Town, Carlisle, Colombo.** (See p. 386.)



**GREAT BRITAIN.** **Light Cruisers.** **Caledon, Calypso, Caradoc.** (See p. 386.)

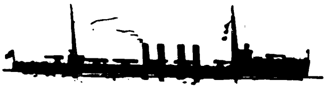


**GREAT BRITAIN.** **Light Cruisers.** **Cambrian, Canterbury, Castor, Constance.** (See p. 387.)

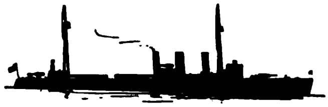


**GREAT BRITAIN.** **Cruisers.** **Courageous, Glorious.** (See p. 385.)

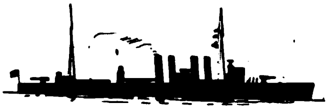
# TORPEDO BOAT DESTROYERS.



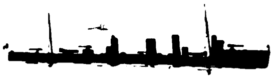
**UNITED STATES.** Torpedo Boat Destroyers. Allen, Alywin, Conyngham. (See p. 439.)



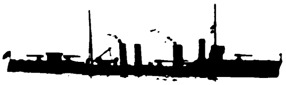
**UNITED STATES.** Torpedo Boat Destroyer. Caldwell. (See p. 439.)



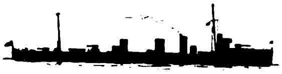
**UNITED STATES.** Torpedo Boat Destroyer. Clemson. (See p. 439.)



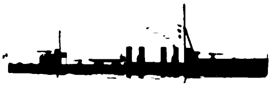
**FRANCE.** Torpedo Boat Destroyers. Algérien, Annamite, Arabe, Bambara, Hova, Kabyle, Marocain, Sakalave, Sénégalais, Somali, Tonkinois, Touareg. (See p. 432.)



**FRANCE.** Torpedo Boat Destroyers. Aventurier, Intrépide, Téméraire. (See p. 432.)

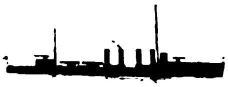


**JAPAN.** Torpedo Boat Destroyer. Kaba. (See p. 436.)

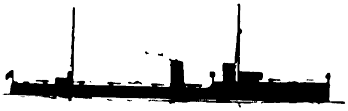


**FRANCE.** Torpedo Boat Destroyers. Enseigne Roux, Mécanicien Principal Lestin. (See p. 432.)

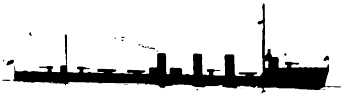
**ITALY.** Torpedo Boat Destroyers. Angelo Bassini, E. Cosenz, Francesco Stocco, Giacinto Carini, Giacoma Medici, Giovanni G. Acerbi, Giuseppe la Farina, Giuseppe la Masca, Giuseppe Sirtori, Nicola Fabrizi, Vincenzo G. Orsini. (See p. 434.)



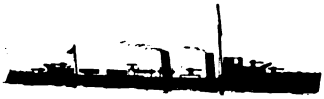
**FRANCE.** Torpedo Boat Destroyers. Bouclier, Casque, Cimeterre. (See p. 432.)



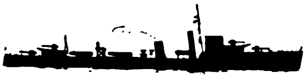
**ITALY.** Torpedo Boat Destroyer. Carlo Mirabello. (See p. 402.)



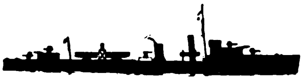
**JAPAN.** Torpedo Boat Destroyer. Amatsukaze. (See p. 435.)



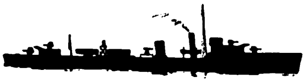
**GREAT BRITAIN.** Torpedo Boat Destroyer. Broke. (See p. 426.)



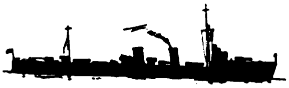
**GREAT BRITAIN.** Torpedo Boat Destroyers. Vansittart, Venomous, Verity, Volunteer, Wanderer, Whitehall, Whitshed, Wild Swan, Wishart, Witch, Wren. (See p. 427.)



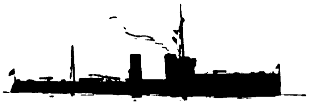
**GREAT BRITAIN.** Torpedo Boat Destroyers. Vancouver, Vanessa, Vanity, Vanoc, Vanquisher, Vectis, Vega, Velox, Vendetta, Venetia, Venturous, Verdun, Versatile, Vesper, Vidette, Vimiera, Violent, Vivacious, Vivien. Vortigern. (See pp. 427 & 428.)



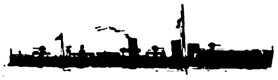
**GREAT BRITAIN.** Torpedo Boat Destroyers. Viceroy, Viscount, Voyager, Wakeful, Walker, Walpole, Walrus, Warwick, Watchman, Waterhen, Wessex, Westcott, Westminster, Whirlwind, Whitley, Winchelsea, Winchester, Wolfhound, Wolsey, Woolston, Wrestler, Wryneck. (See pp. 427 & 428.)



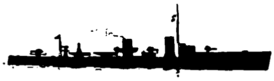
**JAPAN.** Torpedo Boat Destroyer. Momo. (See p. 436.)



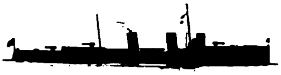
**ITALY.** Torpedo Boat Destroyer. Alessandro Poerio. (See p. 434.)



**GREAT BRITAIN.** Torpedo Boat Destroyers. Tower, Trenchant, Ulster, Umpire, Undine, Urchin, Ursa, Ursula. (See p. 429.)

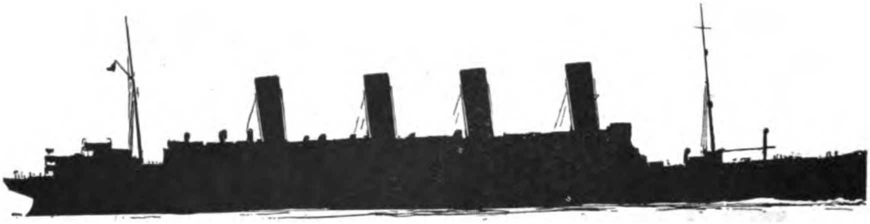


**GREAT BRITAIN.** Torpedo Boat Destroyers. Shikari, Simoom, Tasmania, Tattoo. (See pp. 390, 426, & 427.)

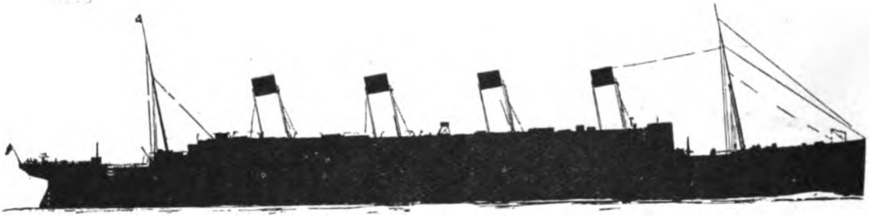


**ITALY.** Torpedo Boat Destroyer. Palestro. (See p. 435.)

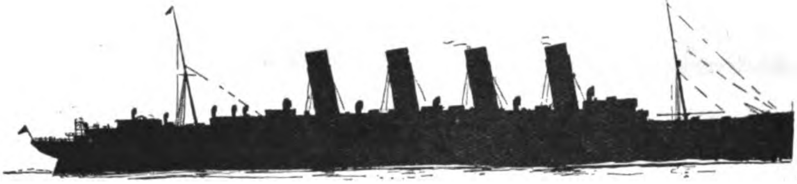
## MERCHANT SHIPS.



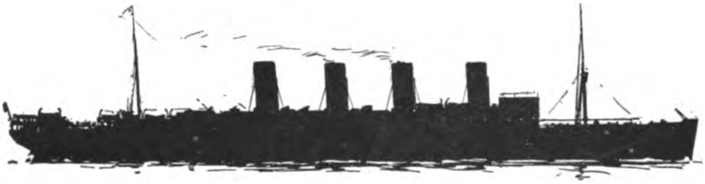
**AQUITANIA. Cunard.** Length, 868 ft. 7 ins.; Gross Tonnage, 45,847; Funnels: Red, Black Tops.



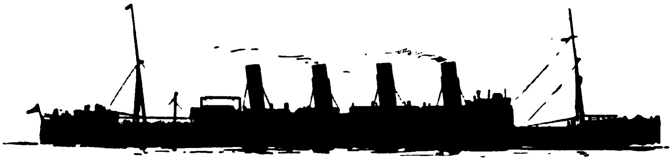
**OLYMPIC. White Star.** Length, 852 ft. 5 ins.; Gross Tonnage, 46,439; Funnels: Buff, Black Tops.



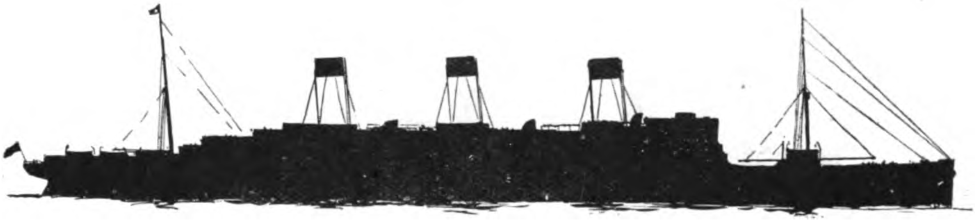
**MAURETANIA. Cunard.** Length, 762 ft. 2 ins.; Gross Tonnage, 30,696; Funnels: Red, Black Tops.



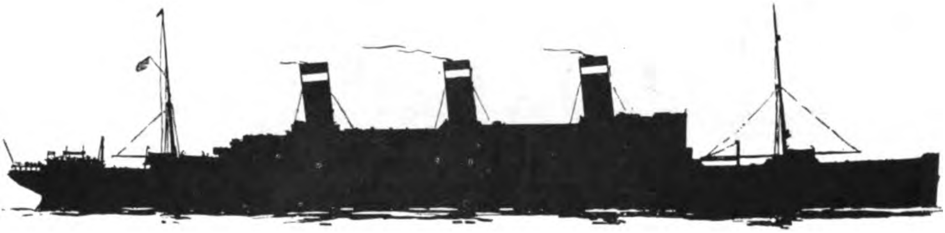
**FRANCE. Cie. Générale Transatlantique.** Length, 689 ft. 2 ins.; Gross Tonnage, 23,666 Funnels: Red, Black Tops.



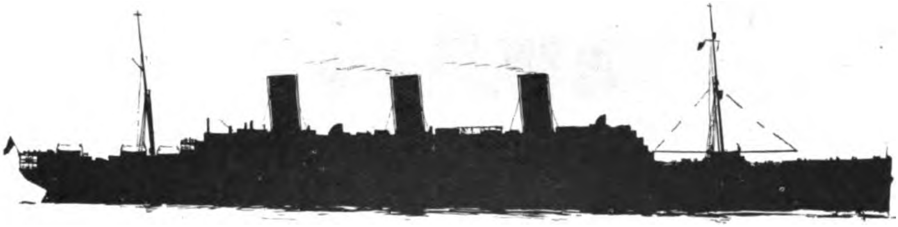
**ARUNDEL CASTLE. Union Castle.** Length, 630 ft. 5 ins.; Gross Tonnage, 18,980; Funnels: Red, Black Tops.



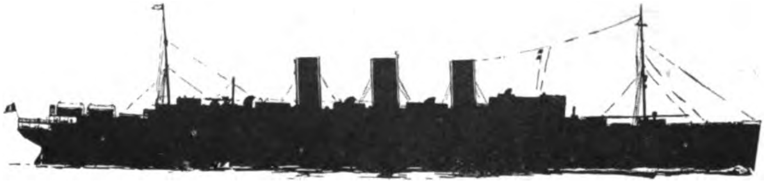
**MAJESTIC.** **White Star.** Length, 915 ft. 5 ins.; Gross Tonnage, 56,551; Funnels: Buff, Black Tops.



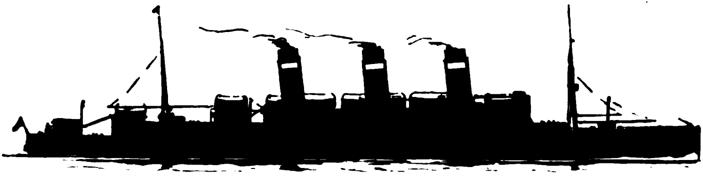
**LEVIATHAN.** **United States Shipping Board.** Length, 907 ft.; Gross Tonnage, 59,957; Funnels: Red, White Band, Blue Tops.



**BERENGARIA.** **Cunard.** Length, 883 ft. 6 ins.; Gross Tonnage, 52,226; Funnels: Red, Black Tops.

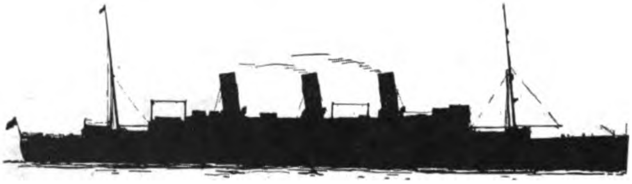


**PARIS.** **Cie. Générale Transatlantique.** Length, 735 ft. 4 ins.; Gross Tonnage, 34,569; Funnels: Red, Black Tops.

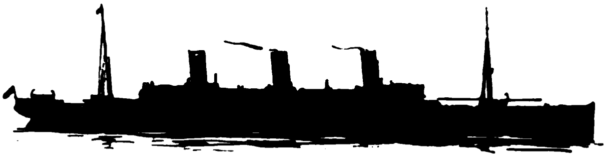


**BELGENLAND.** **Red Star Line.** Length, 697 ft.; Gross Tonnage, 27,132; Funnels: Black, White Band.

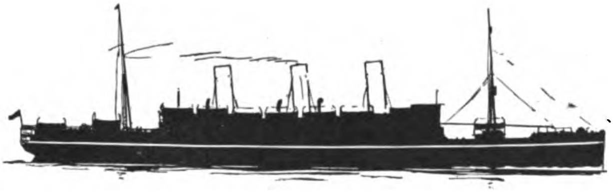
**CAP POLONIO.** **Hamburg South Amerika.** Length, 637·7 ft.; Gross Tonnage, 20,576; Funnels: White, Red Tops.



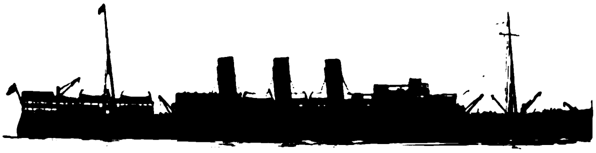
**EMPRESS OF CANADA.** Canadian Pacific. Length, 627 ft.; Gross Tonnage, 21,517; Funnels: Yellow.



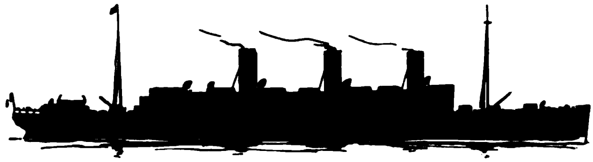
**RELIANCE.** American Mail Corporation. Length, 592 ft.; Gross Tonnage, 16,798. Funnels: Yellow, Two Blue Bands.



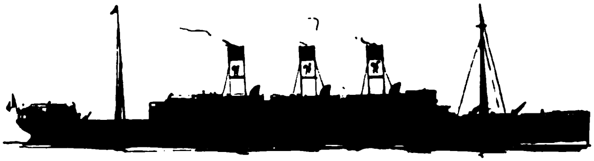
**EMPRESS OF AUSTRALIA.** Canadian Pacific. Length, 589 ft. 8 ins.; Gross Tonnage, 21,861; Funnels: Yellow.



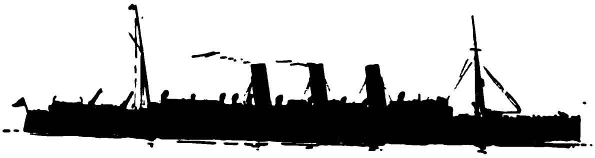
**NALDERA.** Peninsular and Oriental. Length, 580 ft. 9 ins.; Gross Tonnage, 15,825;
**NARKUNDA.** „ „ „ Length, 581 ft. 4 ins.; Gross Tonnage, 16,118;
Funnels: Black.



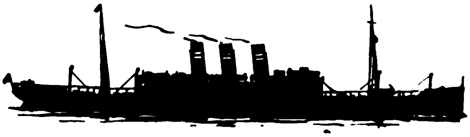
**MASSILIA.** Cie. Sud Atlantique. Length, 579 ft.; Gross Tonnage, 15,147; Funnels: Buff, Black Tops. Cockerel on sides.



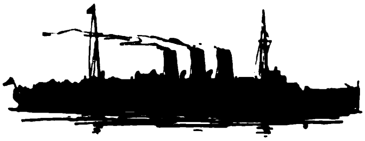
**LUTETIA.** Cie. Sud Atlantique. Length, 579 ft.; Gross Tonnage, 14,654; Funnels: Buff, Black Tops. Cockerel on side.



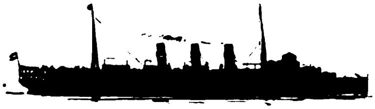
**EMPRESS OF ASIA. EMPRESS OF RUSSIA.** Canadian Pacific.
Length, 570 ft. 1 in.; Gross Tonnage, 16,909;
Funnels: Yellow.



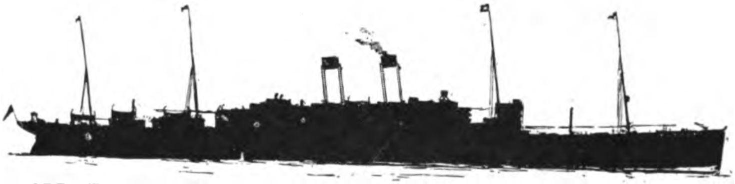
**TAIREA. TAKLIWA. TALAMBA.** British India S.N. Co.
Length, 449 ft. 6 ins.; Gross Tonnage, 8,000;
Funnels: Black, Two White Bands, Black Top.



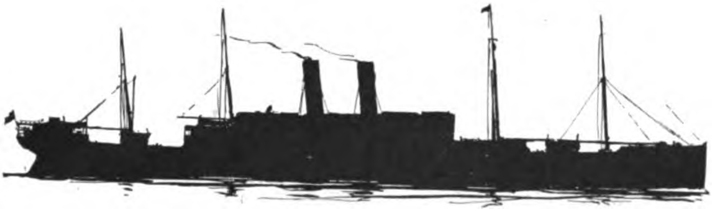
**PRINCESS KATHLEEN. PRINCESS MARGUERITA.** Canadian Pacific.
Length, 350 ft.; Gross Tonnage, 6,000;
Funnels: Yellow.



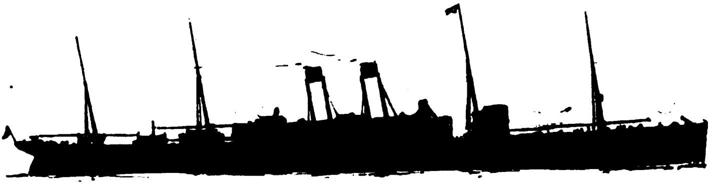
**CUIDAD DE BUENOS AIRES. CUIDAD DE MONTE VIDEO.** Argentine Steam Navigation Co. Length, 350 ft.; Gross Tonnage, 3,864;
Funnels: Yellow, Black Tops.



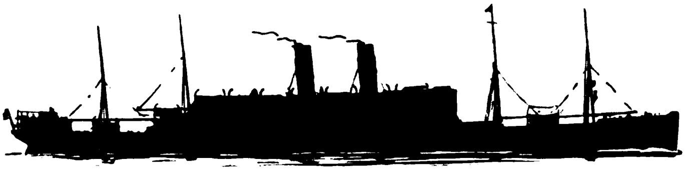
**ADRIATIC.** White Star. Length, 709 ft. 2 ins.; Gross Tonnage, 24,541;
Funnels: Buff, Black Tops.



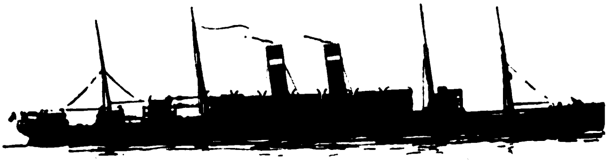
**GEORGE WASHINGTON.** United States Shipping Board. Length 699 ft.;
Gross Tonnage 23,788;
Funnels: Red, White Band, Blue Top. U.S.A. shield on side.



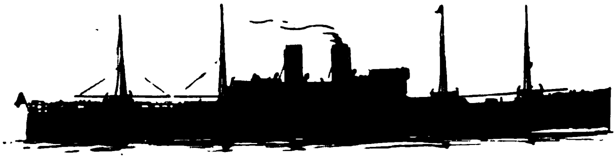
**CEDRIC. CELTIC.** **White Star.** Length, 680 ft. 9 ins. ; Gross Tonnage, 21,073 ;
Funnels : Buff, Black Tops.



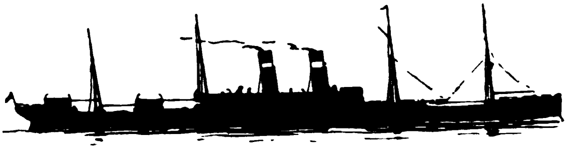
**EMPRESS OF SCOTLAND.** **Canadian Pacific.** Length, 677 ft. ; Gross Tonnage, 25,128 ;
Funnels : Yellow.



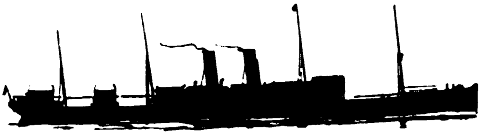
**LAPLAND.** **Red Star Line.** Length, 605 ft. ; Gross Tonnage, 18,565 ;
Funnels : Black, White Band.



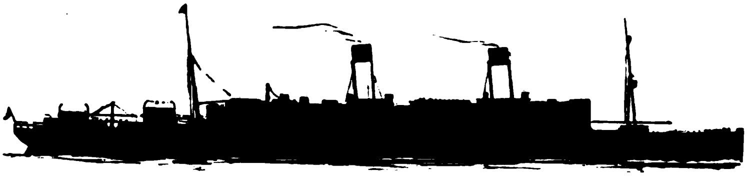
**ALBERT BALLIN. DEUTSCHLAND.** **Hamburg Amerika Line.** Length, 602 ft. 6 ins. ;
Gross Tonnage, 20,815 ;
Funnels : Yellow.



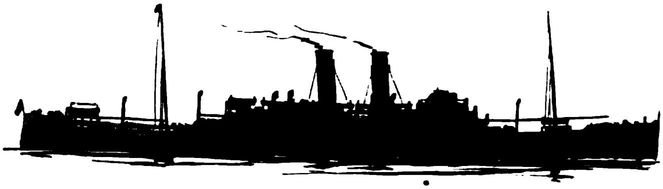
**FINLAND. KROONLAND.** **International Mercantile Marine Co.** Length, 560 ft. ;
Gross Tonnage, 12,230 ;
Funnels : Black, White Band.



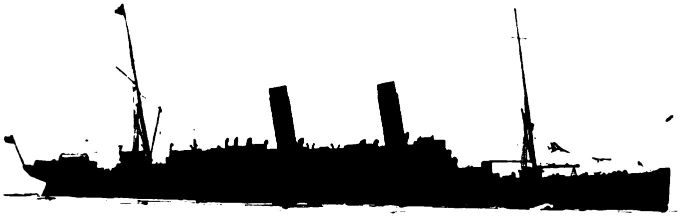
**LATVIA.** **Det Ostasiatiske Kompagnie Akties.** Length, 475 ft. ; Gross Tonnage, 8,332
Funnels : Yellow.



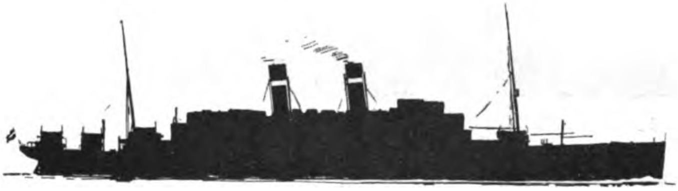
**HOMERIC.** **White Star.** Length, 751 ft.; Gross Tonnage, 34,351; Funnels: Buff, Black Tops.



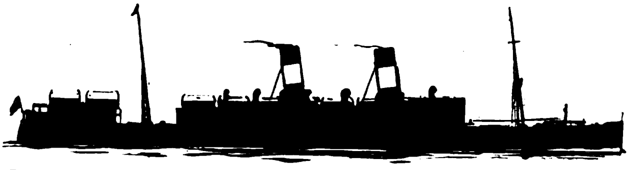
**ORAMA.** **ORONSAY.** **Orient.** Length, 658 ft.; Gross Tonnage, 20,000. Funnels: Buff.



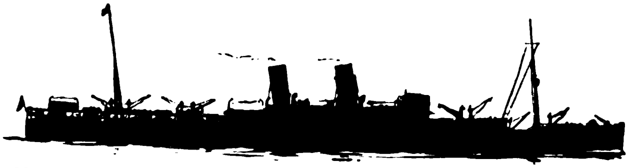
**CARONIA.** **Cunard.** Length, 650 ft.; Gross Tonnage, 19,687; Funnels: Red, Black Tops.



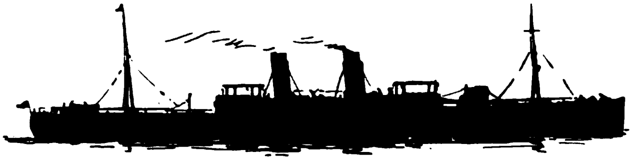
**ROTTERDAM.** **Holland Amerika.** Length, 650 ft.; Gross Tonnage, 24,149; Funnels: Buff, Two Blue Bands with White Band between, Buff Top.



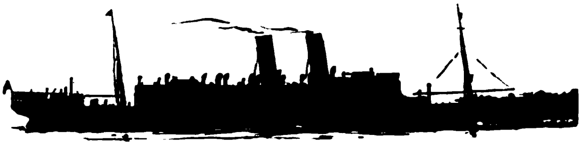
**GIULIO CESARE.** **Navigazione Generale Italiana.** Length, 626 ft.; Gross Tonnage, 21,657; Funnels: Black, Broad White Band.



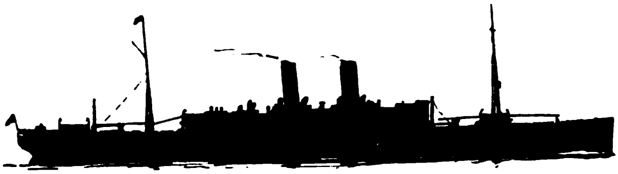
**MOOLTAN.** **MALOJA.** **Peninsular and Oriental.** Length, 625 ft.; Gross Tonnage, 20,847; Funnels: Black.



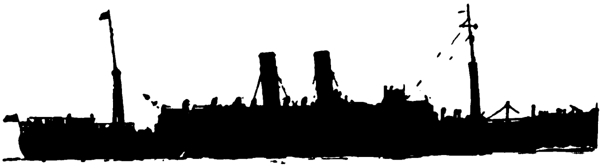
**REGINA.** White Star—Dominion Line. Length, 600 ft.; Gross Tonnage, 16,500; Funnels: Red, White and Red Rings, Black Tops.



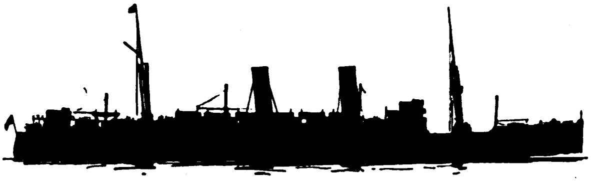
**MONTLAURIER.** Canadian Pacific. Length, 590 ft.; Gross Tonnage, 16,992; Funnels: Yellow.



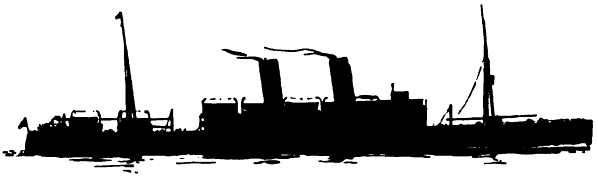
**OHIO.** Royal Mail Steam Packet Co. Length, 588 ft. 8 ins.; Gross Tonnage, 18,000; Funnels: Buff.



**ORMONDE.** Orient. Length, 580 ft. 5 ins.; Gross Tonnage, 14,853; Funnels: Buff.

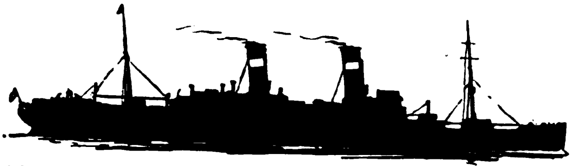


**AORANGI.** Union Steamship Co. of N.Z. Length, 580 ft.; Gross Tonnage, 17,500; Funnels: Red, Black Tops.

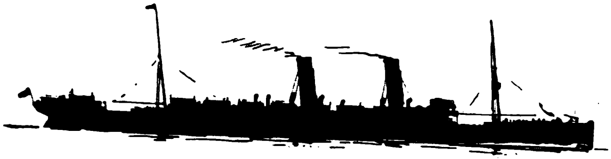


**VEENDAM. VOLENDAM.** Holland America Line. Length, 576 ft.; Gross Tonnage, 15,434: Funnels: Buff, White Band between Two Green.

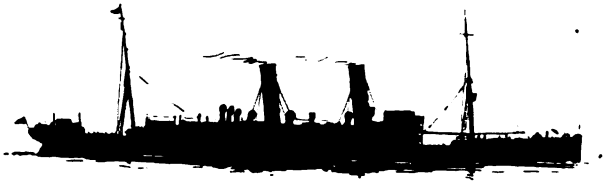
**SAXON.** **Union Castle.** Length, 570 ft. 5 ins. ; Gross Tonnage, 12,385 ;
Funnels : Red, Black Tops.



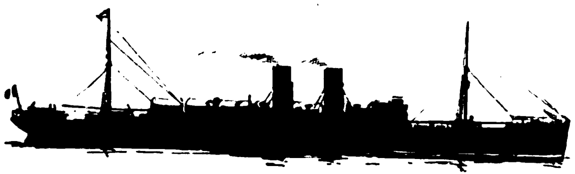
**CONTE ROSSO.** **CONTE VERDE.** **Lloyd Sabaudo.** Length, 570 ft. 2 ins. ;
Gross Tonnage, 17,048 ;
Funnels : Yellow, White Band between Two Narrow Green.



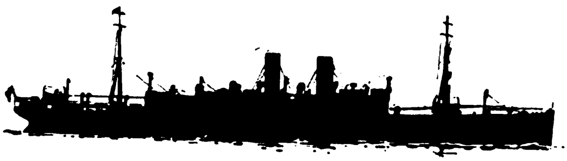
**ARMADALE CASTLE.** **Union Castle.** Length, 570 ft. 1 in. ; Gross Tonnage, 12,973 ;
Funnels : Red, Black Tops.



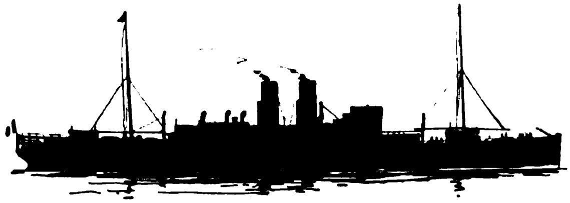
**BALMORAL CASTLE.** **EDINBURGH CASTLE.** **Union Castle.**
Length, 520 ft. ; Gross Tonnage, 13,361 ;
Funnels : Red, Black Tops.



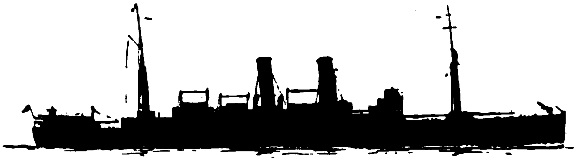
**ROCHAMBEAU.** **Cie. Générale Transatlantique.** Length, 559 ft. ; Gross Tonnage, 17,400 ;
Funnels : Red, Black Tops.



**ORMUZ.** **Orient.** Length, 550 ft. ; Gross Tonnage, 14,588 ;
Funnels : Buff.

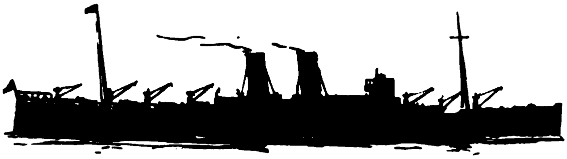


**DE GRASSE.** **Cie. Générale Transatlantique.** Length, 550 ft.; Gross Tonnage, 17,000; Funnels: Red, Black Tops.

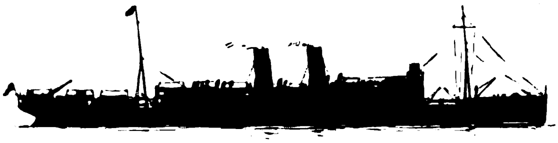


**MONTCALM. MONTCLARE. MONTROSE. Canadian Pacific.** Length, 549 ft. 5 ins.; Gross Tonnage, 16,418; Funnels: Yellow.

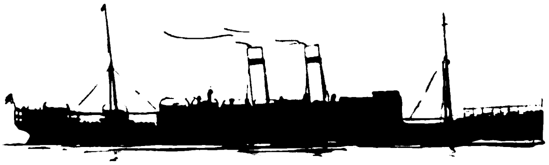
**EMPRESS OF BRITAIN. Candian Pacific.** Length, 548 ft. 8 ins.; Gross Tonnage, 15,857; Funnels: Yellow.



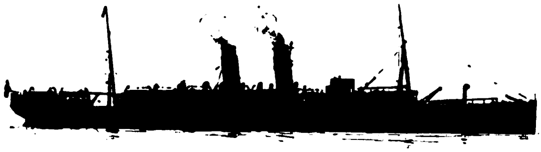
**RAJPUTANA. RANCHI. RAWALPINDI. Peninsular and Oriental.** Length, 547 ft.; Gross Tonnage, 16,100; Funnels: Black.



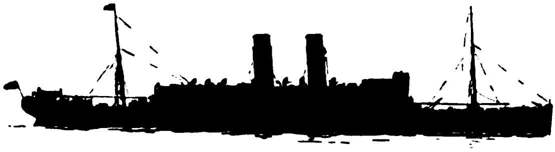
**MALWA. MANTUA. MOREA. Peninsular and Oriental.** Length, 540 ft.; Gross Tonnage, 10,941; Funnels: Black.



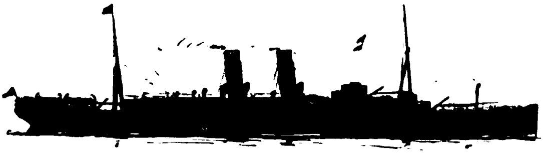
**GELRIA. Koninklijke Hollandsche Lloyd.** Length, 540 ft.; Gross Tonnage, 13,868; Funnels: Yellow, Black Band.



**ORSOVA. Orient.** Length, 536 ft. 2 ins.; Gross Tonnage, 12,036; Funnels: Buff.

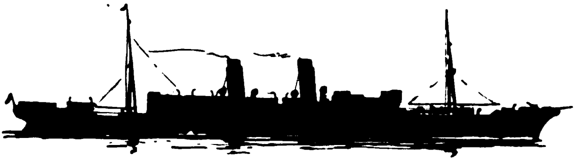


**ORVIETO. Orient.** Length, 535 ft. 3 ins.; Gross Tonnage, 12,133; Funnels: Buff.

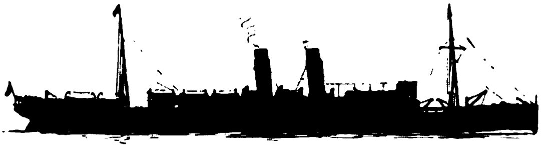


**OSTERLEY. Orient.** Length, 535 ft.; Gross Tonnage, 12,129; Funnels: Buff.

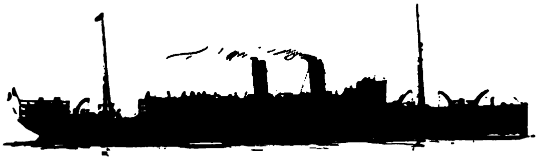
**STAVANGERFJORD. Norske Amerikalinje.** Length, 532 ft. Gross Tonnage, 12,977; Funnels: Yellow, Two Red and Two White Bands with Blue Band between.



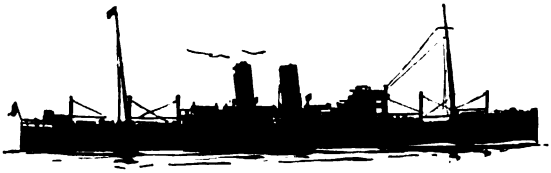
**VASCO NUNEZ DE BALBOA. Compañia Trasatlantica.** Length, 531 ft.; Gross Tonnage, 7,842; Funnels: Black.



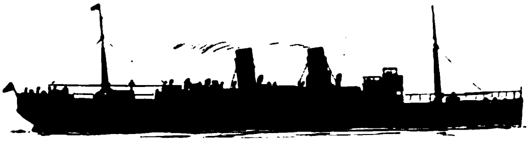
**MACEDONIA. Peninsular and Oriental.** Length, 530 ft. 4 ins.; Gross Tonnage, 11,089; Funnels: Black.



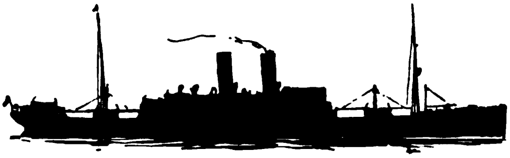
**ANDRE LEBON. Messageries Maritimes.** Length 528 ft. ; Gross Tonnage, 13,681 ; Funnels : Black.



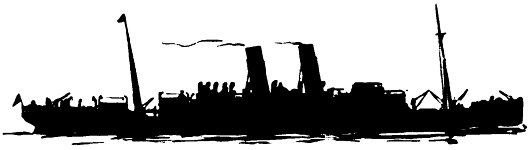
**CATHAY. CHITRAL. Peninsular and Oriental.** Length, 525 ft. ; Gross Tonnage, 15,000 ; Funnels : Black.



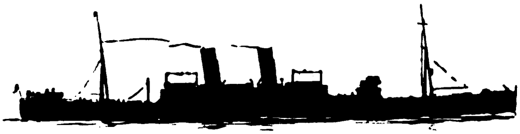
**NIAGARA. Union Steam Ship Co. of N.Z.** Length, 524 ft. 7 ins. ; Gross Tonnage, 13.415 ; Funnels : Red, Black Tops.



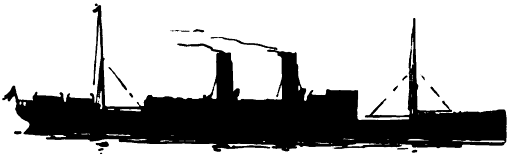
**FREDERIK VIII. Det Forenede Damskibs Setskab.** Length, 523 ft. ; Gross Tonnage, 11,850 : Funnels : Black, Red Band.



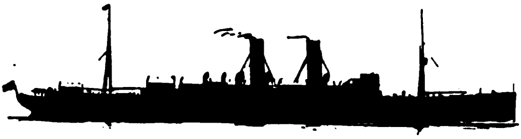
**KAISER-I-HIND. Peninsular and Oriental.** Length, 520 ft. ; Gross Tonnage, 11,430 ; Funnels : Black.



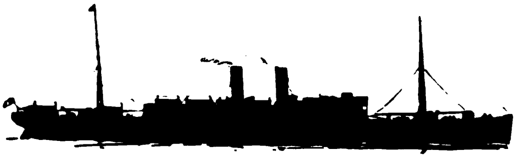
**MINNEDOSA. Canadian Pacific.** Length, 520 ft. ; Gross Tonnage, 14.000 ; Funnels : Yellow.



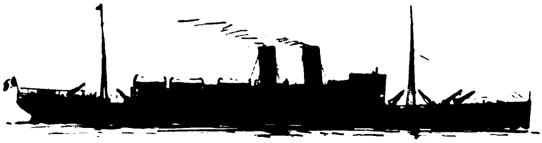
**BERGENSFJORD.** **Norske Amerikalinje.** Length, 512 ft. ; Gross Tonnage, 10,709 ;
Funnels : Yellow, Two Red and Two White Bands with Blue Band between.



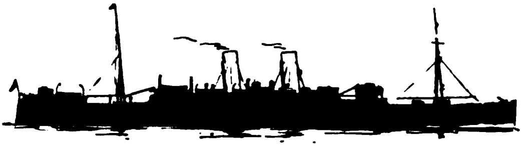
**H. F. ALEXANDER.** **Admiral Line.** Length, 509 ft. Gross Tonnage, 8,255 ;
Funnels : Tan, Black Top, White Disc with Flag.



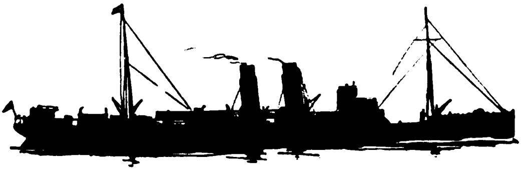
**CHICAGO.** **Cie. Générale Transatlantique.** Length, 508 ft. ; Gross Tonnage, 14,250 ;
Funnels : Red, Black Tops.



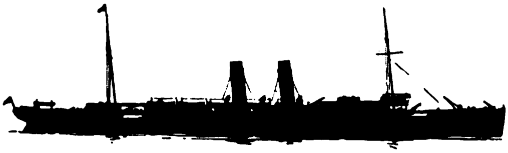
**PAUL LECAT.** **Messageries Maritimes.** Length, 508 ft. ; Gross Tonnage, 12,988 ;
Funnels : Black.



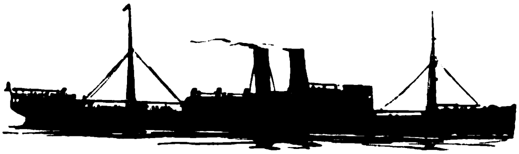
**METAGAMA.** **Canadian Pacific.** Length, 500 ft. 4 ins. ; Gross Tonnage, 12,420 ;
Funnels : Yellow.



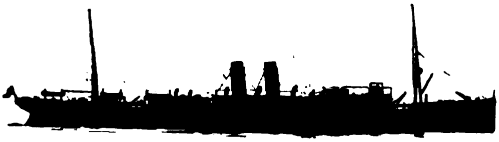
**RASMAK.** **Peninsular and Oriental.** Length, 500 ft. ; Gross Tonnage, 10,000 ;
Funnels : Black.



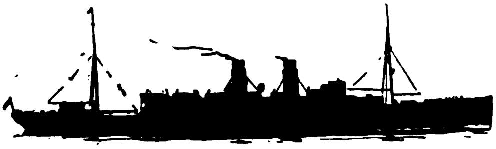
**CHINA.** **Peninsular and Oriental.** Length, 500 ft. 5 ins.; Gross Tonnage, 7,952 ; Funnels : Black.



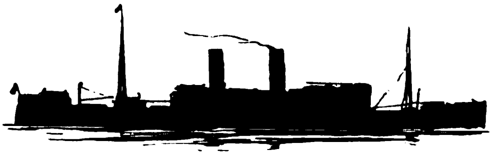
**ORCADES.** **Orient.** Length, 492 ft.; Gross Tonnage, 9,764; Funnels : Buff.



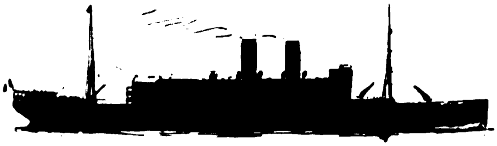
**CALEDONIA.** **Peninsular and Oriental.** Length, 486 ft. ; Gross Tonnage, 7,622 ; Funnels : Black.



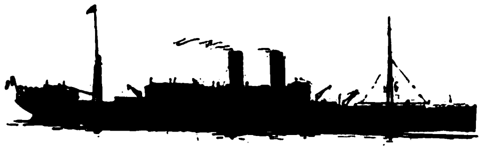
**ALFONSO XII.** **Compañia Trasatlantica.** Length, 481 ft. 4 ins. ; Gross Tonnage, 6,743 ; Funnels : Black.



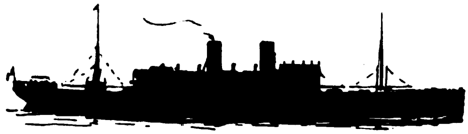
**PATRIA.** **Wm. Ruys & Zonen.** Length, 480 ft. ; Gross Tonnage, 9,891 ; Funnels : Black.



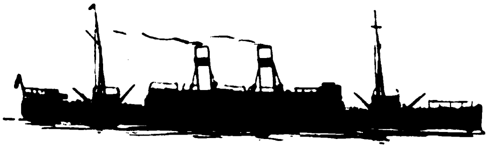
**SPHINX.** **Messageries Maritimes.** Length, 479 ft. ; Gross Tonnage, 11,374 ; Funnels : Black.



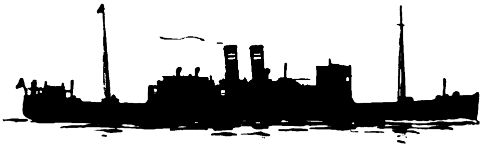
**PORTHOS.** **Messageries Maritimes.** Length, 476 ft. ; Gross Tonnage, 12,691 ; Funnels : Black.



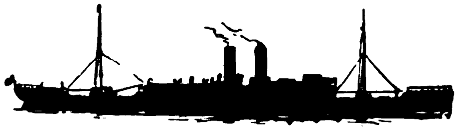
**CUBA.** **Cie. Générale Transatlantique.** Length, 476 ft. ; Gross Tonnage, 11,400 ; Funnels : Red, Black Tops.



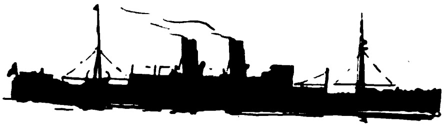
**FLANDRIA.** **ORANIA.** **Koningen Hollandsche Lloyd.** Length, 470 ft. ; Gross Tonnage, 9,673 ; Funnels : Yellow, Black Band.



**M.S. TALMA.** **TILAWA.** **British India S.N. Co.** Length, 450 ft. ; Gross Tonnage, 10,000. Funnels : Black, Two White Bands, Black Top.

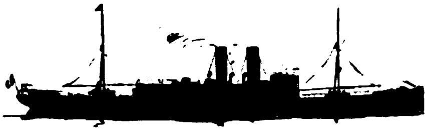


**PEROU.** **Cie. Générale Transatlantique.** Length, 440 ft. ; Gross Tonnage, 6,600 ; Funnels : Red, Black Tops.

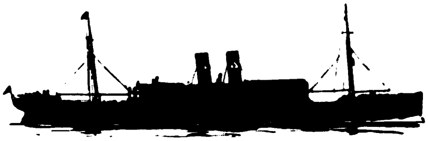


**DE LA SALLE.** **Cie. Générale Transatlantique.** Length, 440 ft. ; Gross Tonnage, 7,600 ; Funnels : Red, Black Tops.

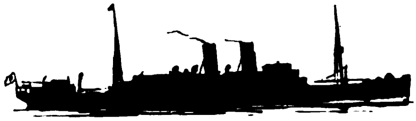
**ASIE.** **Chargeurs Reunis.** Length, 439 ft. : Gross Tonnage, 9,059
Funnels : Yellow, Red Stars on White Band.



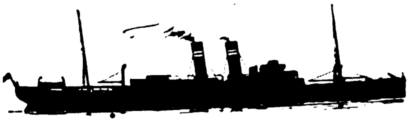
**HAYTI.** **Cie. Générale Transatlantique.** Length, 410 ft. ; Gross Tonnage, 6.179 ;
Funnels : Red, Black Tops.



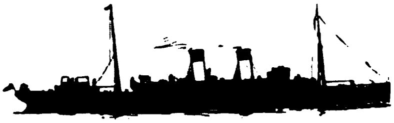
**M.S. RIO BRAVO. RIO PANUCO.** **Flensburger Dampfer Co (H. Schuldt).**
Length, 410 feet ; Gross Tonnage, 6,000.
Funnels : Black, Blue Band, White Diamond with Red S,



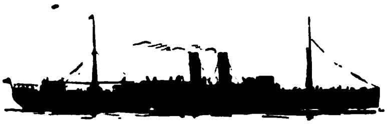
**NAGASAKA MARU. SHANGHAI MARU.** **Nippon Yusen Kaisha.** Length, 402 ft. ;
Gross Tonnage, 5,272 ;
Funnels : Black.



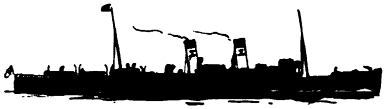
**ARANKOLA.** **British India S.N. Co.** Length, 390 ft. 3 ins. ; Gross Tonnage, 4,129 ;
Funnels : Black, Two White Bands, Black Tops.



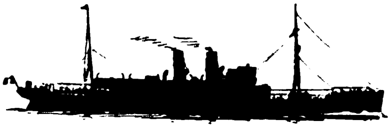
**ANGLIA. CAMBRIA. HIBERNIA. SCOTIA.** **London, Midland and Scottish Railway.**
Length, 380 ft. 5 ins. ; Gross Tonnage, 3,460 ;
Funnels : Yellow, Black Tops.



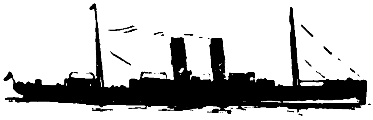
**WAHINE.** **Union Steam Ship Co. of N.Z.** Length, 375 ft. ; Gross Tonnage, 4,436 ;
Funnels : Red, Black Tops.



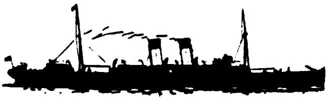
**KEIFUKU MARU.** **"K" Line.** Length, 375 ft. ; Gross Tonnage, 5,857 ;
Funnels : Black, Red Top, Large White K in Red.



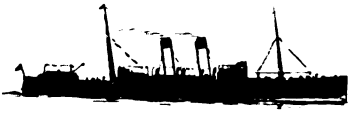
**GOUVERNEUR GENERAL CHANZY.** **French Government.** Length, 361 ft. ;
Gross Tonnage, 4,500.



**ST. ANDREW.** **ST. DAVID.** **ST. PATRICK.** **Great Western Railway.**
Length, 351 ft. 1 in. ; Gross Tonnage, 2,495 ;
Funnels : Red, Black Tops.

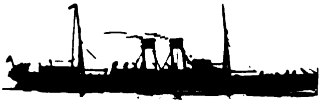


**ARVONIA.** **MENEVIA.** **London, Midland and Scottish Railway.** Length, 329 ft. ;
Gross Tonnage, 1,842 ;
Funnels : Yellow, Black Tops.

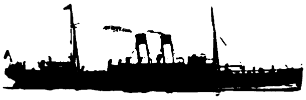


**ANTWERP.** **MALINES.** **London and North Eastern Railway.** Length, 321 ft. 6 ins. ;
Gross Tonnage, 2,957 ;
Funnels : Yellow, Black Tops.

**CURRAGHMORE.** **London, Midland and Scottish Railway.** Length, 307 ft. 1 in. ;
Gross Tonnage, 1,587 ;
Funnels : Yellow, Black Tops.

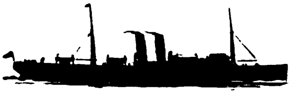


**GREENORE.** **London, Midland and Scottish Railway.** Length, 306 ft. ;
Gross Tonnage, 1,488 ;
Funnels : Yellow, Black Tops.

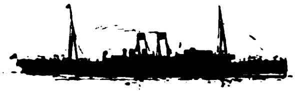


**RATHMORE. London, Midland and Scottish Railway.** Length, 299 ft. 5 ins. :
Gross Tonnage, 1,569 ;
Funnels : Yellow, Black Tops.

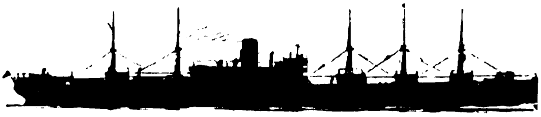
**HANTONIA. NORMANNIA. Southern Railway.** Length, 290 ft. 3 ins. ;
Gross Tonnage, 1,567 ;
Funnels : Buff.



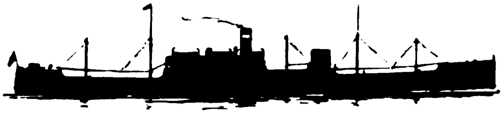
**REINDEER. Great Western Railway.** Length, 280 ft. ; Gross Tonnage, 1,101 ;
Funnels : Red, Black Tops.



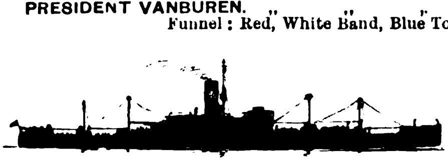
**DIEPPE. Southern Railway.** Length, 273 ft. 5 ins ; Gross Tonnage, 1,228 ;
Funnels : White, Black Tops.



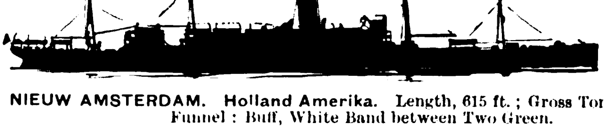
**ROTORUA. New Zealand Shipping Co.** Length, 526 ft. 6 ins. ; Gross Tonnage, 12,184 ;
Funnel : Buff.



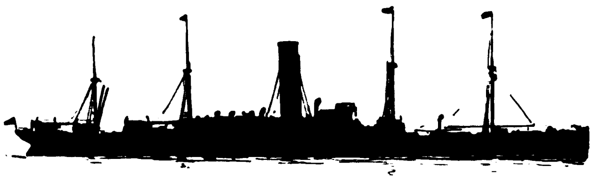
**PRESIDENT ADAMS. United States Shipping Board.** Length, 502 ft. ; Gross Tonnage, 10,558 ;
**PRESIDENT GARFIELD.** ,, ,, ,, ,, ,, 10,558 ;
**PRESIDENT HARRISON.** ,, ,, ,, ,, ,, 10,533 ;
**PRESIDENT HAYES.** ,, ,, ,, ,, ,, 10,533 ;
**PRESIDENT MONROE.** ,, ,, ,, ,, ,, 10,533 ;
**PRESIDENT POLK.** ,, ,, ,, ,, ,, 10,533 ;
**PRESIDENT VANBUREN.** ,, ,, ,, ,, ,, 10,533 ;
Funnel : Red, White Band, Blue Top, U.S.A. Shield on Side.



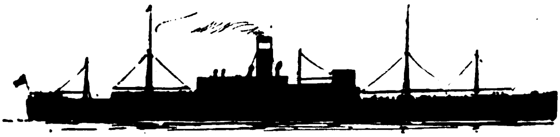
**BARONESA. Furness (Houlder).** Length, 431 ft. : Gross Tonnage, 8,663
Funnel : Black, Red Band, White Maltese Cross, Black Top.



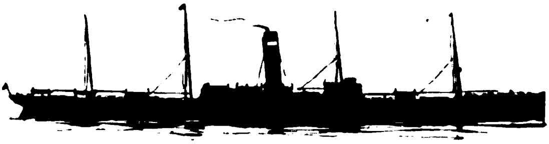
**NIEUW AMSTERDAM. Holland Amerika.** Length, 615 ft. ; Gross Tonnage, 17,149 ;
Funnel : Buff, White Band between Two Green.



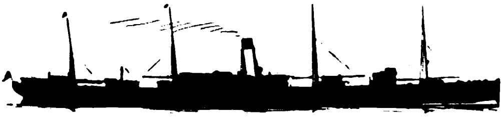
**SAXONIA. Cunard.** Length, 580 ft.; Gross Tonnage, 14,197 : Funnel : Red, Black Top.



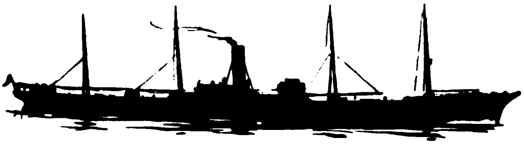
**PRESIDENT ROOSEVELT. United States Shipping Board.** Length 535 ft.; Gross Tonnage, 14,127 ; Funnel : Red, White Band, Blue Top, U.S.A. Shield on side.



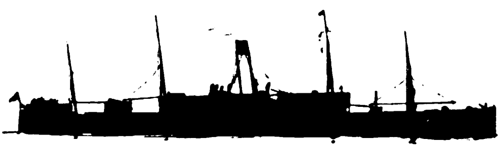
**HAVERFORD. Internation Mercantile Marine Co.** Length, 531 ft. ; Gross Tonnage, 11,635 ; Funnel : Black, White White Band.



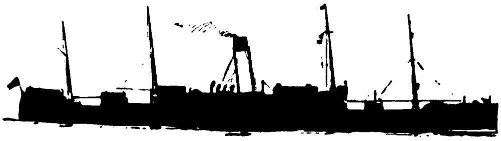
**ATHENIC. Shaw, Savill, and Albion Co.** Length, 500 ft. 3 ins. ; Gross Tonnage, 12,366; Funnel : Buff, Black Top.



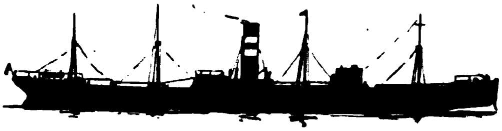
**COLONIA. Telegraph Construction and Maintenance Co.** Length, 487 ft.; Gross Tonnage, 8,010 ; Funnel : Yellow.



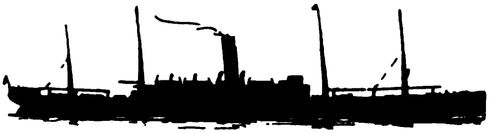
**YORKSHIRE. Bibby Line.** Length, 482 ft. 4 ins. ; Gross Tonnage, 10,250 ; Funnel: Salmon Pink, Black Top.



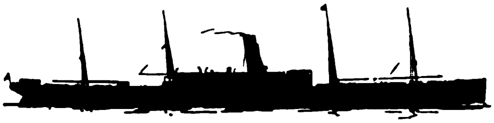
**LANCASHIRE.** **Bibby Line.** Length, 482 ft. 4 ins.; Gross Tonnage, 9,445; Funnel: Salmon Pink, Black Top.



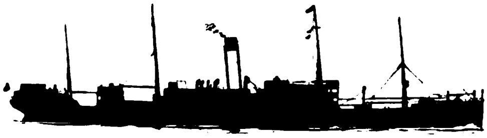
**DIPLOMAT.** **Harrison Line.** Length, 482 ft.; Gross Tonnage, 8,218; Funnel: Black, Red Band between Two White.



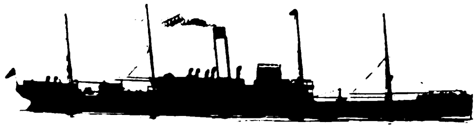
**MENOMINEE.** **Atlantic Transport.** Length, 475 ft.; Gross Tonnage, 6,919; Funnel: Red, Black Top.



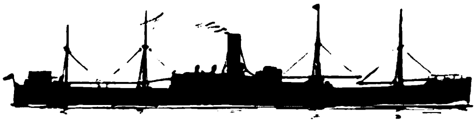
**POLAND.** **Atlantic Transport.** Length, 475 ft. 6 ins.; Gross Tonnage, 8,282; Funnel: Red, Black Top.



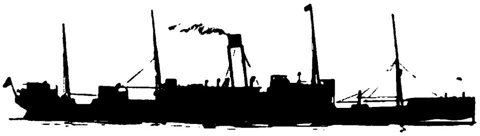
**OXFORDSHIRE.** **Bibby Line.** Length, 474 ft. 7 ins.; Gross Tonnage, 8,624 Funnel: Salmon Pink, Black Top.



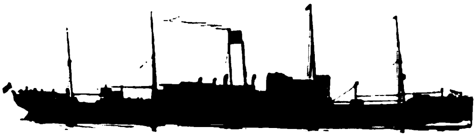
**WARWICKSHIRE.** **Bibby Line.** Length, 470 ft. 8 ins.; Gross Tonnage, 8,012; Funnel: Salmon Pink, Black Top.



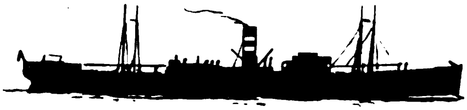
**LEITRIM.** **Union Steam Ship Co. of N.Z.** Length, 470 ft.; Gross Tonnage, 9,540; Funnel: Red, Black Top.



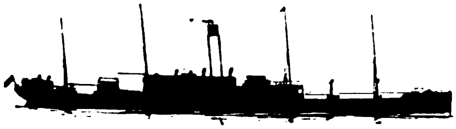
**GLOUCESTERSHIRE.** Bibby Line. Length, 467 ft. 2 ins. ; Gross Tonnage, 8,124 ;
Funnel : Salmon Pink, Black Top.



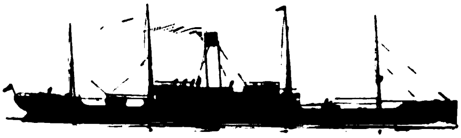
**LEICESTERSHIRE.** Bibby Line. Length, 467 ft. 2 ins. ; Gross Tonnage, 8,059 ;
Funnel : Salmon Pink, Black Top.



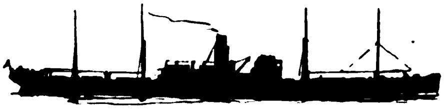
**COLLEGIAN.** Harrison Line. Length, 455 ft. ; Gross Tonnage, 5,850 ;
Funnel : Black, Red Band between Two White.



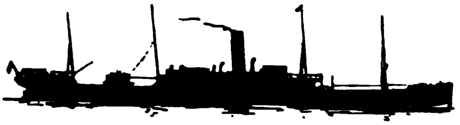
**HEREFORDSHIRE.** Bibby Line. Length 452 ft. 3 ins. ; Gross Tonnage, 7,192 ;
Funnel : Salmon Pink, Black Top.



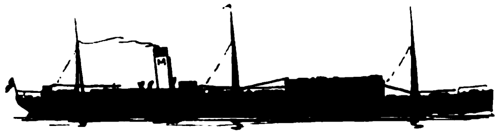
**DERBYSHIRE.** Bibby Line. Length, 452 ft. ; Gross Tonnage, 6,776 ;
Funnel : Salmon Pink, Black Top.



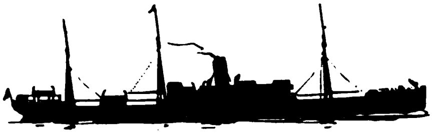
**HYACINTHUS. HYPATIA.** Houston Line. Length, 452 ft. ; Gross Tonnage, 5,725 ;
Funnel : Red, Black Top, Two Black Bands.



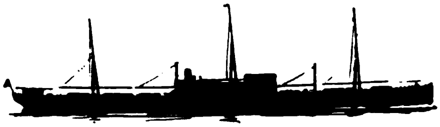
**SAMARIA.** Cie. Sud Atlantique. Length, 445 ft. ; Gross Tonnage, 6007 ;
Funnel : Yellow, Black Top.



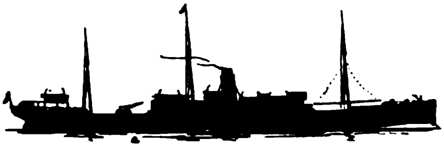
**MAUI.** **Matson Navigation Co.** Length 484 ft. ; Gross Tonnage, 9,801 ;
Funnel : Yellow, Black Top, with " M."



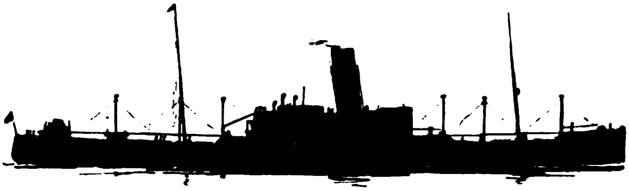
**MANUEL CALVO.** **Compañia Trasatlantica.** Length 435 ft. ; Gross Tonnage, 5,617 ;
Funnel : Black.



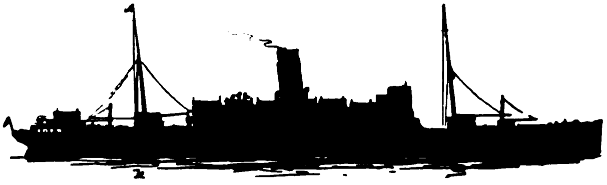
**M.S. BALBOA.** **BUENOS AIRES.** **CANADA.** **Axel Axelson Johnson.**
Length, 426 ft. ; Gross Tonnage, 5,455.



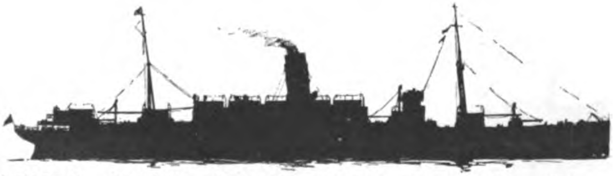
**MONTEVIDEO.** **Compañia Trasatlantica.** Length, 422 ft. ; Gross Tonnage, 5,205
Funnel : Black.



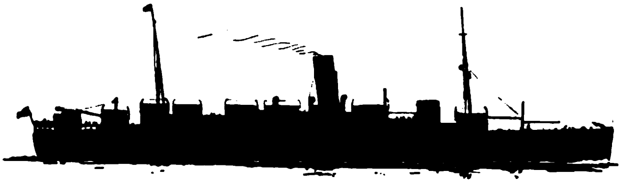
**MINNETONKA.** **MINNEWASKA.** **Atlantic Transport.** Length, 626 ft. ;
Gross Tonnage, 21,998 ;
Funnel : Red, Black Top.



**FRANCONIA.** **Cunard.** Length, 600 ft. ; Gross Tonnage, 20,158 ;
Funnel : Red, Black Top.

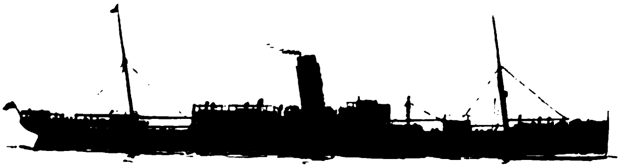


**LACONIA.** **SAMARIA.** **SCYTHIA.** **Cunard.** Length, 600 ft. ; Gross
Tonnage, 20,158 ;
Funnels : Red, Black Top.

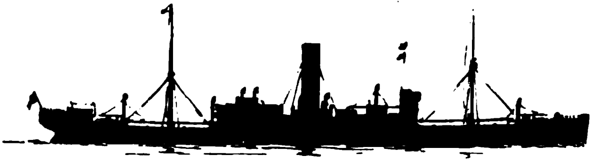


**LANCASTRIA.** **Cunard.** Length, 578 ft. ; Gross Tonnage, 16,700 ;
Funnel : Red, Black Top.

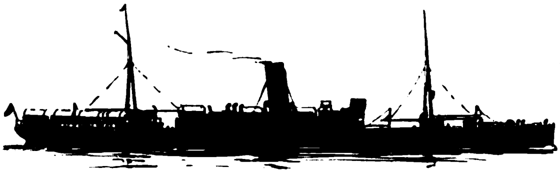
**CAMERONIA.** **Anchor Henderson.** Length, 552 ft. 5 ins. ; Gross Tonnage, 16,280 ;
Funnel : Black.



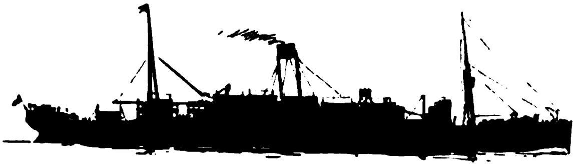
**EURIPIDES.** **Aberdeen Line.** Length, 570 ft. ; Gross Tonnage, 15,000 ;
Funnel : Ochre.



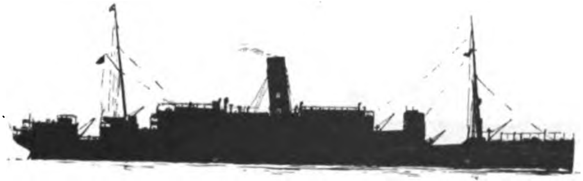
**NESTOR.** **ULYSSES.** **Blue Funnel Line.** Length, 563 ft. 2 ins. ; Gross Tonnage, 14,547 ;
Funnel : Blue, Black Top.



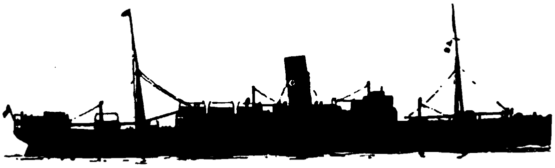
**NOORDAM.** **RIJNDAM.** **Holland Amerika.** Length, 560 ft. ; Gross Tonnage, 12,529 ;
Funnel : Buff, White Band between Two Green.



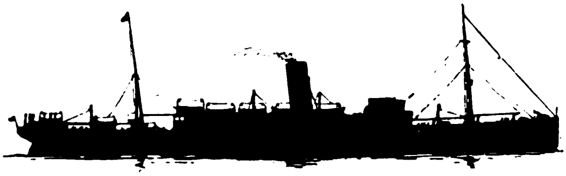
**MEGANTIC.** **White Star.** Length, 550 ft. 4 ins. ; Gross Tonnage, 14,878 ;
Funnel : Buff, Black Top.



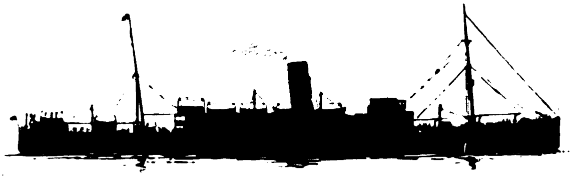
**ALMANZORA.** **Royal Mail Steam Packet Co.** Length, 550 ft. 3 ins. ; Gross Tonnage, 16,034 ;
Funnel : Buff.



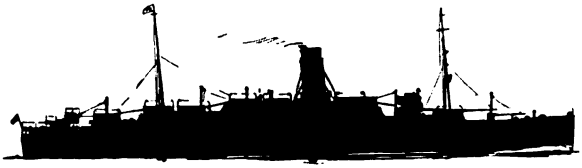
**ORDUNA. Royal Mail Steam Packet Co.** Length, 550 ft. 8 ins. ; Gross Tonnage, 15,499 ; Funnel : Buff.



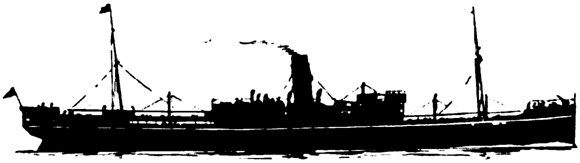
**ORBITA. Royal Mail Steam Packet Co.** Length, 550 ft. 3 ins. ; Gross Tonnage, 15,486 ; Funnel : Buff.



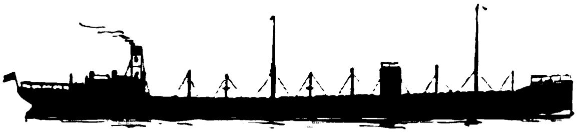
**ORCA. Royal Mail Steam Packet Co.** Length, 550 ft. ; Gross Tonnage, 16,063 ; Funnel : Buff.



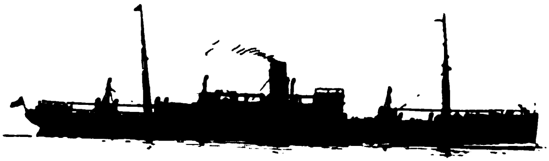
**CALIFORNIA. TUSCANIA. Anchor Henderson.** Length, 550 ft. ; Gross Tonnage, 17,250 ; Funnel : Black.



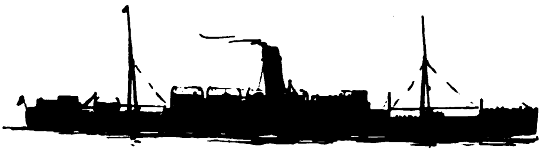
**MOLDAVIA. Peninsular and Oriental.** Length, 550 ft. ; Gross Tonnage, 15,800 ; Funnel : Black.



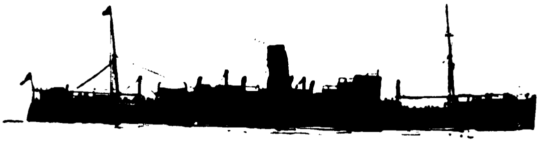
**BETHORE. Ore Steamship Co., N.Y.** Length, 550 ft. ; Gross Tonnage, 14,899 ; Funnel : Grey, Blue and White Bands, White O.



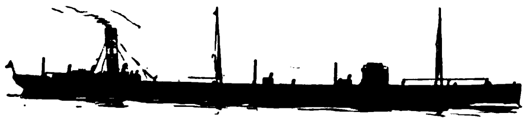
**ESPERANCE BAY. HOBSONS BAY. JERVIS BAY. LARGS BAY. MORETON BAY.** **Australian Commonwealth Line.** Length, 548 ft.; Gross Tonnage, 16,500; Funnels: Yellow.



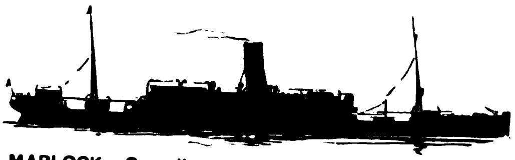
**OROYA. Pacific Steam Navigation Co.** Length, 547 ft.; Gross Tonnage, 14,000; Funnel: Buff.



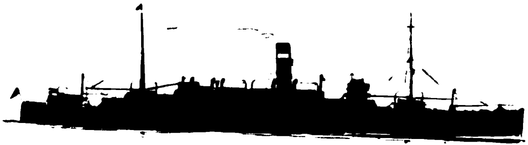
**OROPESA. Pacific Steam Navigation Co.** Length, 530 ft.; Gross Tonnage, 14,072; Funnel: Buff.



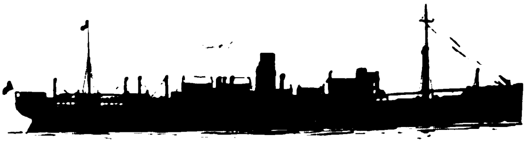
**SAN FRATERNO. SAN GREGORIO. SAN JERONIMO. SAN LORENZO. SAN MELITO. SAN NAZARIO. SAN PATRICIO. Eagle Oil Transport Co.** Length, 527 ft. 3 ins.; Gross Tonnage, 11,929; Funnel: Black, Yellow Band, Black Eagle, Black O on White Band, Yellow Band.



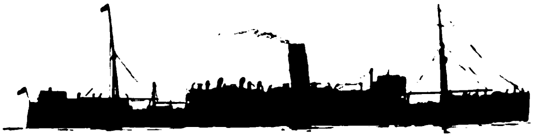
**MARLOCK. Canadian Pacific.** Length, 520 ft.; Gross Tonnage, 10,600; Funnel: Yellow.



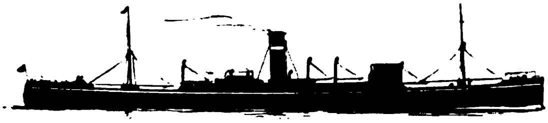
**ATHENIA. Anchor (Donaldson).** Length, 520 ft.; Gross Tonnage, 12,000; Funnel: Black, White Band, Black Top.



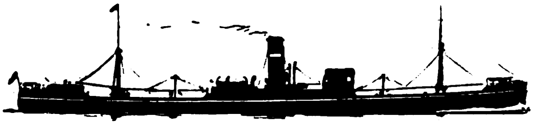
**BARADINE.** **Feninsular and Oriental.** Length, 519 ft. 9 ins.; Gross Tonnage, 13,300; Funnel: Black.



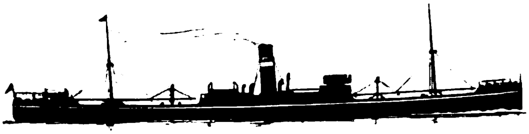
**DIOGENES. SOPHOCLES.** **Aberdeen Line.** Length, 518 ft.; Gross Tonnage, 12,500; Funnel: Ochre.



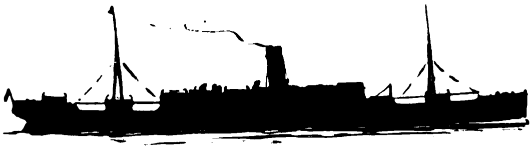
**MANGALORE. MATHURA.** **Anchor Brocklebank.** Length, 518 ft. Gross Tonnage, 9,751; Funnel: Black, White Band, Blue and White Stripe Band, Black Top.



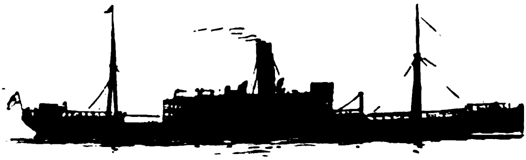
**MALANCHA.** **Anchor Brocklebank.** Length, 518 ft.; Gross Tonnage, 10,572; Funnel: Black, White Band, Blue and White Stripe Band, Black Top.



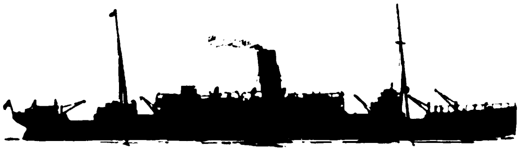
**MACHARDA.** **Anchor Brocklebank.** Length, 518 ft.; Gross Tonnage, 10,464; Funnel: Black, White Band, Blue and White Stripe Band, Black Top.



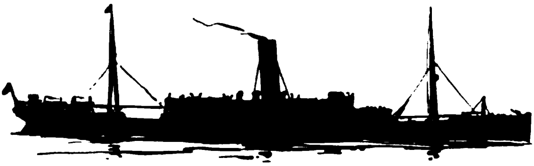
**DROTTNINGHOLM.** **Sverige-Norde-Amerika.** Length, 517 ft.; Gross Tonnage, 12,522; Funnel: Yellow, Blue Disc, Three Gold Crowns.



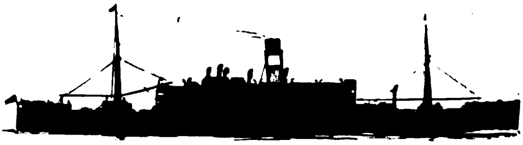
**FUSHIMI MARU. SUWA MARU. Nippon Yusen Kaisha.** Length, 516 ft.; Gross Tonnage, 10,938; Funnel: Black.



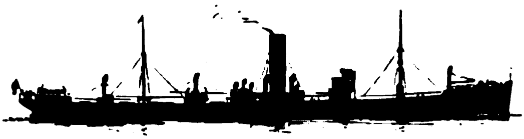
**ARAGUAYA. Royal Mail Steam Packet Co.** Length, 515 ft. 2 ins.; Gross Tonnage, 10,530; Funnel: Buff.



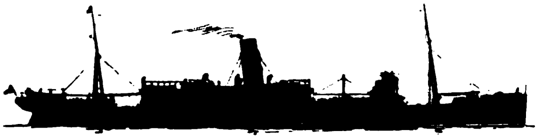
**ORCOMA. Pacific Steam Navigation Co.** Length, 511 ft. 7 ins.; Gross Tonnage, 11,571; Funnel: Buff.



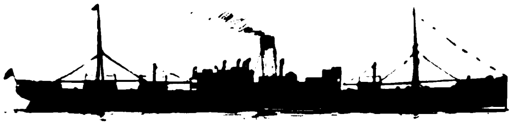
**VANDYCK. VOLTAIRE. Lamport and Holt.** Length, 510 ft.; Gross Tonnage, 13,233; Funnel: Blue, White Band, Black Top.



**ACHILLES. PHILOCTETES. TYNDAREUS. Blue Funnel Line.** Length, 507 ft.; Gross Tonnage, 11,426; Funnel: Blue, Black Top.

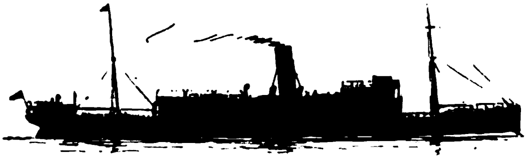


**DEMOSTHENES. THEMISTOCLES. Aberdeen Line.** Length, 506 ft. 6 ins.; Gross Tonnage, 11,223; Funnel: Ochre.

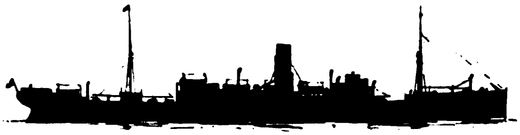


**PORT MELBOURNE. PORT NAPIER. PORT SYDNEY. Commonwealth and Dominion Line.** Length, 501 ft. 3 ins.; Gross Tonnage, 9,152;
Funnel: Red, Black Top.

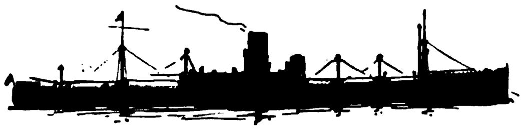
**DARRO. DEMERARA. DESEADO. DESNA. Royal Mail Steam Packet Co.**
Length, 500 ft. 7 ins.; Gross Tonnage, 11,477;
Funnel: Buff.



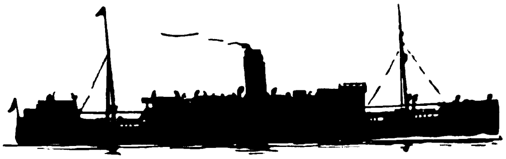
**LLANSTEPHAN CASTLE. Union Castle Line.** Length, 500 ft. 5 ins.; Gross Tonnage, 11,293;
Funnel: Red, Black Top.



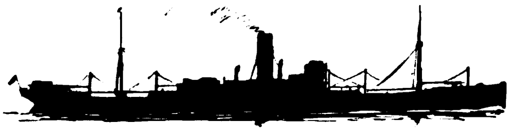
**BELTANA. BENALLA. BERRIMA. BORDA. Peninsular and Oriental.**
Length, 500 ft.; Gross Tonnage, 11,120;
Funnel: Black.



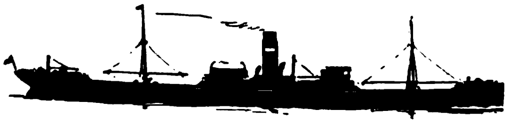
**FORDSDALE. Australian Commonwealth Line.** Length 500 ft.; Gross Tonnage, 9,674;
Funnel: Yellow.



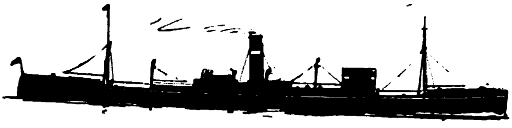
**ALFONSO XIII. CRISTOBOL COLON. Compañia Trasatlantica.**
Length, 500 ft.; Gross Tonnage, 10,322;
Funnel: Black.



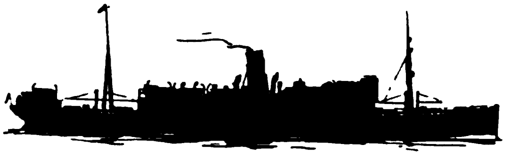
**GLENIFFER. Glen Line.** Length, 500 ft.; Gross Tonnage, 9,429;
Funnel: Red, Black Top.



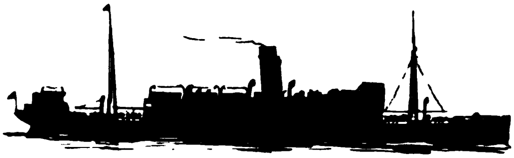
**MAIDAN.** **Anchor Brocklebank Line.** Length, 500 ft. Gross Tonnage, 8,205 ;
Funnel : Black, White Band, Blue and White Stripe Band, Black Top.



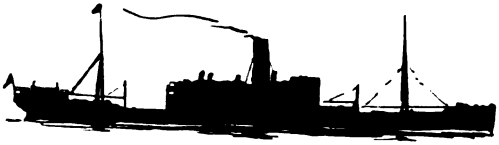
**MAGDAPUR. MANIPUR.** **Anchor Brocklebank Line.** Length, 499 ft. 6 ins. ;
Gross Tonnage, 9,237 ;
Funnel : Black, White Band, Blue and White Stripe Band, Black Top.



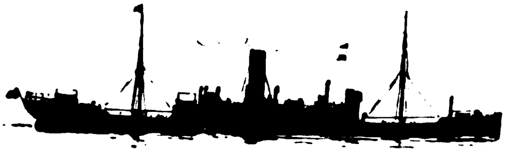
**INFANTA ISABEL DE BORBON.** **Compañia Trasatlantica.** Length, 498 ft. ;
Gross Tonnage, 10,348 ;
Funnel : Black.



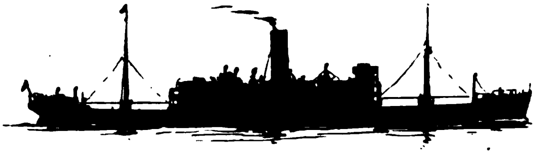
**REINA VICTORIA EUGENIA.** **Compañia Trasatlantica.** Length, 498 ft. ;
Gross Tonnage, 10,137 ;
Funnel : Black.



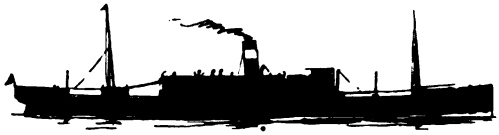
**HAKONE MARU. HAKOZAKI MARU. HARUNA MARU.** **Nippon Yusen Kaisha.**
Length, 495 ft. ; Gross Tonnage, 10,420 ;
Funnel : Black.



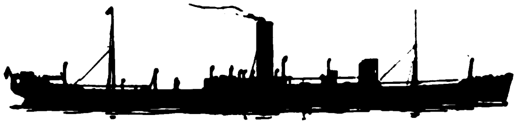
**AENEAS. ANCHISES. ASCANUS.** **Blue Funnel Line.** Length, 493 ft. ; Gross Tonnage, 10,049 ;
Funnel : Blue, Black Top.



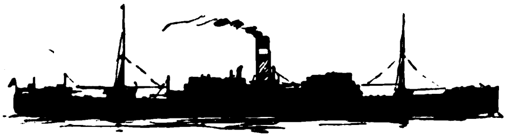
**SARPEDON.** **Blue Funnel Line.** Length, 491 ft.; Gross Tonnage, 11,400;
**DARDANUS.** ,, ,, Length, 459 ft.; Gross Tonnage, 7,900;
Funnel: Blue, Black Top.



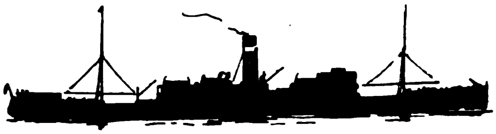
**CAXIAS.** **Lloyd Brasileiro, Cie. de Nav.** Length, 491 ft.; Gross Tonnage, 9,791;
Funnel: Yellow, White Band.



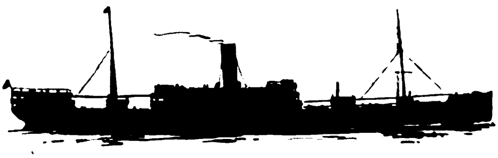
**CALCHAS.** **Blue Funnel Line.** Length, 490 ft. 8 ins.; Gross Tonnage, 10,304;
Funnel: Blue, Black Top.



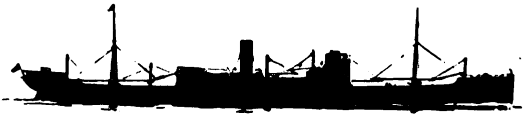
**CITY OF NAGPUR.** **Ellerman City Line.** Length, 490 ft.; Gross Tonnage, 10,138;
Funnel: Buff, White Band, Black Top.



**CITY OF EXETER.** **Ellerman City Line.** Length, 486 ft. 7 ins.; Gross Tonnage, 9,447;
Funnel: Buff, White Band, Black Top.



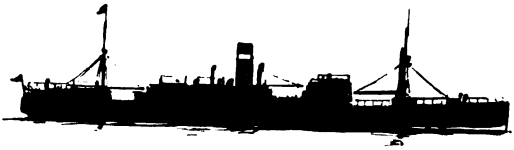
**RUMUERA.** **New Zealand Shipping Co.** Length, 485 ft.; Gross Tonnage, 11,276;
Funnel: Yellow.



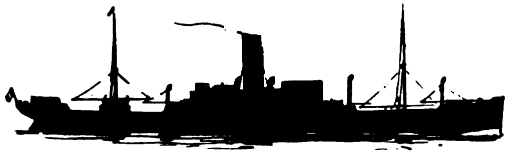
**GLENAPP. GLENBEG. GLENGARRY. GLENOGLE. Glen Line.** Length, 485 ft.; Gross Tonnage, 6,802; Funnel: Red, Black Top.

**DINTELDYK. Holland Amerika.** Length, 485 ft.; Gross Tonnage, 8,400; Funnel: Buff, Two Blue Bands, White between, Buff Top.

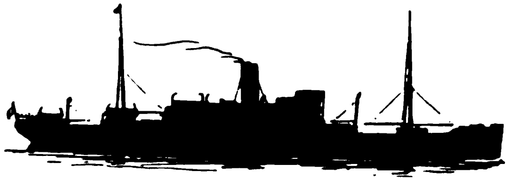
**M.S. LOCHKATRINE. Royal Mail Steam Packet Co.** Length, 485 ft.; Gross Tonnage, 9,409; Funnel: Buff.



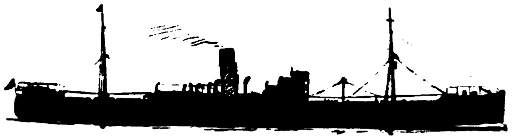
**CITY OF PARIS. Ellerman City Line.** Length, 484 ft. 7 ins.; Gross Tonnage, 10,245; Funnel: Buff, White Band, Black Top.



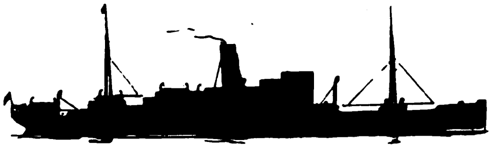
**CEYLAN. MALTE. QUISSANTE. Chargeurs Reunis.** Length, 483 ft.; Gross Tonnage, 9,000; Funnel: Yellow, Red Stars on White Band.



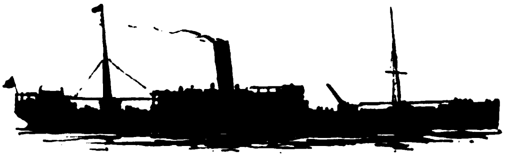
**FORMOSE**
**GROIX.** } **Chargeurs Reunis.** Length, 481 ft. 6 ins.; Gross Tonnage, 10,500;
**HOCDIC**
**BELLE ISLE.**
**AURIGNY.** ,, ,, ,, ,, ,, ,, 9,591;
**DESIRADE** } ,, ,, ,, ,, ,, ,, 9,589;
**EUBEE** ,, ,, ,, ,, ,, ,, 9,580;
Funnel: Yellow, Red Stars on White Band.



**PORT ADELAIDE. PORT AUCKLAND. PORT BOWEN. PORT CAMPBELL. PORT CAROLINE. PORT DARWIN. PORT DENISON. PORT HUNTER. PORT KEMBLA. PORT NICHOLSON. Commonwealth and Dominion Line.** Length, 481 ft. 2 ins.; Gross Tonnage, 8,422; Funnel: Red, Black Top.

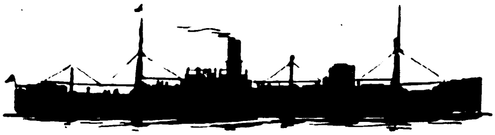


**MEDUANA. MOSELLA. Cie. Sud Atlantique.** Length, 481 ft.; Gross Tonnage, 10,500; Funnel: Yellow, Black Top.

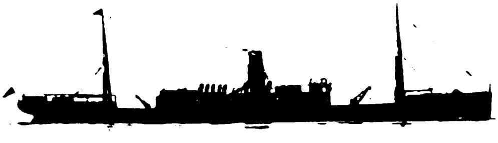


**RUAHINE. New Zealand Shipping Co.** Length, 480 ft. 7 ins.; Gross Tonnage, 10,839; Funnel: Yellow.

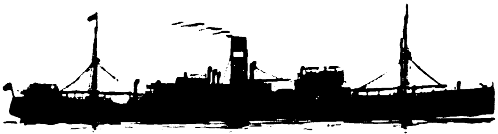
**NEURALIA. NEVASA. British India S.N. Co.** Length, 480 ft. 5 ins.; Gross Tonnage, 9,082; Funnel: Black, Two White Bands, Black Top.



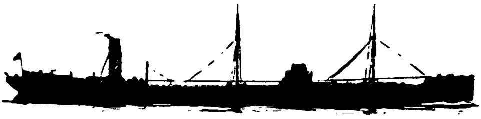
**TURAKINA. New Zealand Shipping Co.** Length, 480 ft.; Gross Tonnage, 10,000; Funnel: Yellow.



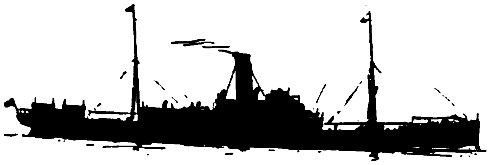
**KASHGAR. KASHMIR. Peninsular and Oriental.** Length, 479 ft. 9 ins.; Gross Tonnage, 8,840 Funnel: Black.



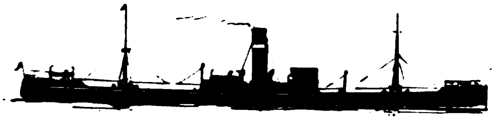
**CITY OF SIMLA. Ellerman City Line.** Length, 476 ft. 7 ins.; Gross Tonnage, 9,468; Funnel: Buff, White Band, Black Top.



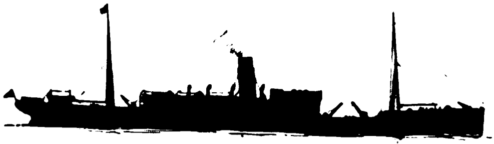
**IROQUOIS.** **Anglo American Oil Co.** Length, 476 ft. 3 ins. ; Gross Tonnage, 9,202 ;
Funnel : Red, Black Top.



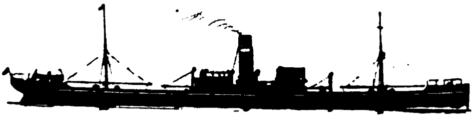
**DUNLUCE CASTLE. DURHAM CASTLE. Union Castle**
Length, 475 ft. 5 ins. ; Gross Tonnage, 8,130 ;
Funnel : Red, Black Top.



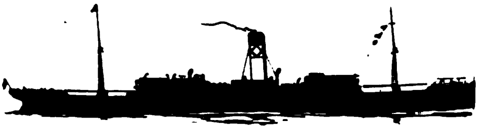
**MAHSUD. MAIHAR. MALAKAND. MANAAR. MATHERAN. Anchor Brocklebank.**
Length, 470 ft. 4 ins. ; Gross Tonnage, 8,077 ;
Funnel : Black, White Band, Blue and White Stripe Band, Black Top.



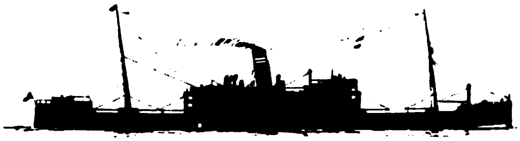
**DELTA. DEVANHA. DONGOLA. Peninsular and Oriental.**
Length, 470 ft. 3 ins. ; Gross Tonnage, 8,097 ;
Funnel : Black.



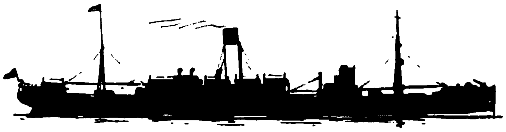
**MALAKUTA.** **Anchor Brocklebank.** Length, 470 ft. 2 ins. ; Gross Tonnage, 7,205 ;
Funnel : Black, White Band, Blue and White Stripe Band, Black Top.



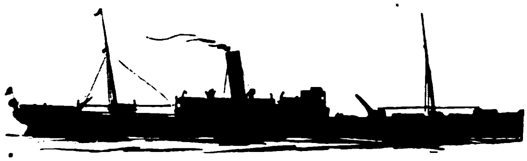
**CALAMARES.** **United Fruit Co..** Length, 470 ft. ; Gross Tonnage, 7,782 ;
**PASTORES.** ,, ,, ,, Length, 470 ft. ; Gross Tonnage, 7,242 ;
Funnel : Buff, White Diamond on Red Band, Black Top.



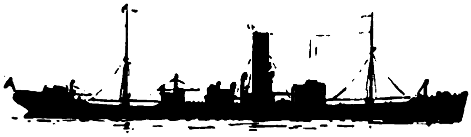
**MADURA. MALDA. MANTOLA. MATIANA. British India S.N. Co.** Length, 465 ft. 2 ins.; Gross Tonnage, 8,975;
Funnel: Black, Two White Bands, Black Top.



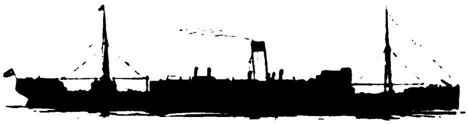
**ARAWA. TAINUI. Shaw, Savill, and Albion Co.** Length, 460 ft.; Gross Tonnage, 9,372;
Funnel: Buff, Black Top.



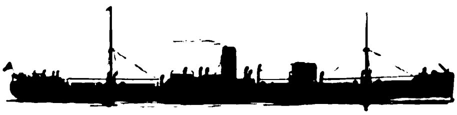
**RIMUTAKA. RUAPEHU. New Zealand Shipping Co.** Length, 457 ft. 6 ins.;
Gross Tonnage, 8,887;
Funnel: Yellow.



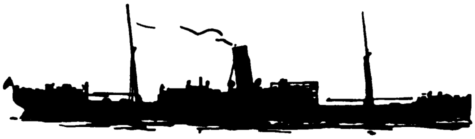
**AGAPENOR. ELPENOR. EUMAEUS. GLAUCUS. HELENUS. LYCAON. MACHAON. MENTOR. PHEMUS. PYRRHUS. TEIRESIAS. TROILUS. Blue Funnel Line.**
Length, 455 ft. 2 ins.; Gross Tonnage, 7,587;
Funnel: Blue, Black Top.



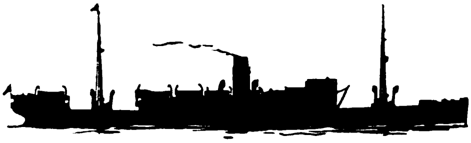
**KONINGEN DER NEDERLANDEN. Stoomvaart Maatschappy.**
Length, 455 ft.; Gross Tonnage, 8,300;
Funnel: Buff, Black Top.



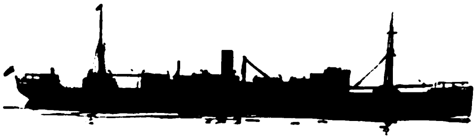
**CLAN MACTAGGART. Clan Line.** Length, 452 ft. 7 ins.; Gross Tonnage, 7,602;
**CLAN MACTAVISH.** „ „ Length, 469 ft.; Gross Tonnage, 7,619;
Funnel: Black, two Red Bands.



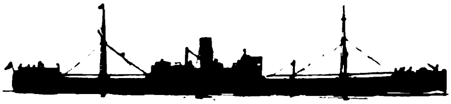
**GARTH CASTLE. GRANTULLY CASTLE. Union Castle.**
Length, 452 ft. 6 ins ; Gross Tonnage, 7,715 ;
Funnel: Red, Black Top.



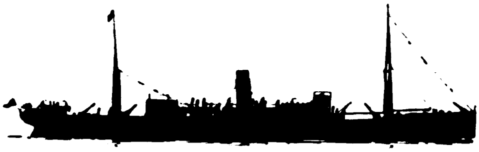
**MANUEL ARNUS. Compañia Trasatlantica.** Length, 451 ft. 6 ins. ; Gross Tonnage, 7,578 ;
Funnel: Black.



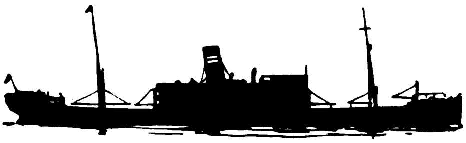
**M.S. ABA. M.S. ADDA. Elder Dempster.** Length, 450 ft. 3 ins. ; Gross Tonnage, 7,938 ;
Funnel: Buff.



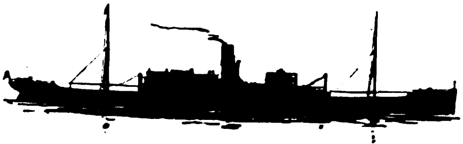
**M.S. DORSETSHIRE. M.S. SOMERSETSHIRE. Bibby Line.**
Length, 450 ft. 3 ins. ; Gross Tonnage, 7,500 ;
Funnel: Salmon Pink, Black Top.



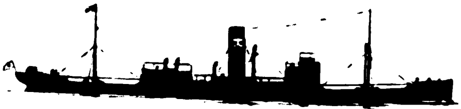
**SARDINIA. SICILIA. SOUDAN. Peninsular and Oriental.**
Length, 450 ft. 2 ins. ; Gross Tonnage, 6,684 ;
Funnel: Black.



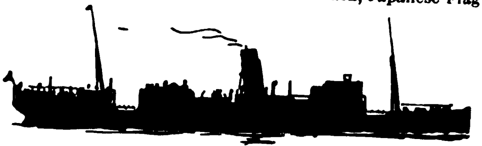
**M.S. DOMALA, British India S.N. Co.** Length, 450 ft. ; Gross Tonnage, 8,441 ;
Funnel : Black, Two White Bands, Black Top.



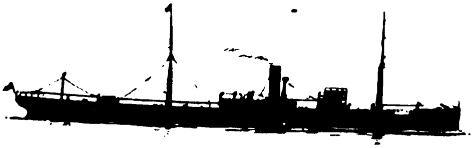
**CIRCASSIA. Anchor Henderson.** Length, 450 ft.; Gross Tonnage, 7,180; Funnel: Black.



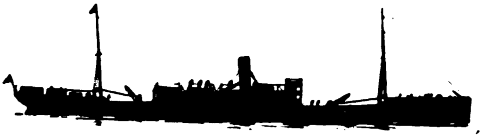
**LONDON MARU. PARIS MARU. Osaka Shosen Kaisha.** Length, 450 ft.; Gross Tonnage, 7,600; Funnel: Black, Japanese Flag on Side.



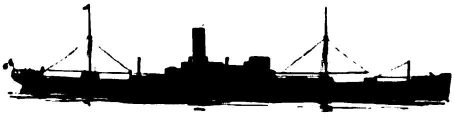
**MAKURA. Union Steam Ship Co. of N.Z.** Length, 450 ft.; Gross Tonnage, 8,075; Funnel: Red, Black Top.



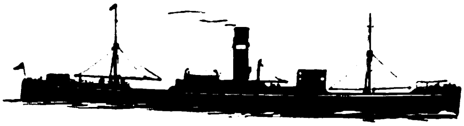
**BAKARA. BARAMBAH. BOONAH. Australian Commonwealth Line.** Length, 450 ft.; Gross Tonnage, 5,970; Funnel: Black.



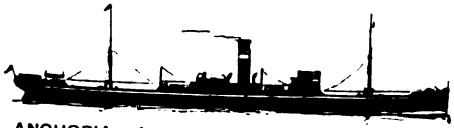
**NANKIN. NOVARA. Peninsular and Oriental.** Length, 449 ft. 7 ins.; Gross Tonnage, 7,058; Funnel: Black.



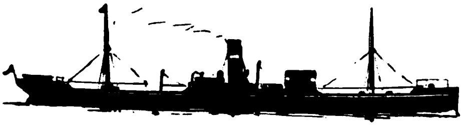
**M.S. CAMRANH. Chargeurs Reunis.** Length, 449 ft. 5 ins.; Gross Tonnage, 8,500; Funnel: Yellow, Red Stars on White Band.



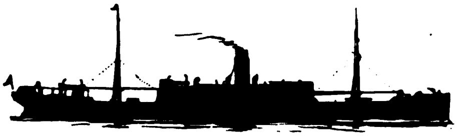
**MASIRAH. Anchor Brocklebank Line.** Length, 448 ft.; Gross Tonnage, 6,836; Funnel: Black, White Band, Blue and White Stripe Band, Black Top.



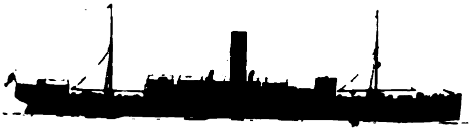
**ANCHORIA. Anchor Brocklebank Line.** Length, 446 ft. 4 ins.; Gross Tonnage, 6,112; Funnel: Black, White Band, Blue and White Stripe Band, Black Top.



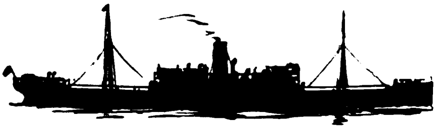
**MAHRATTA. MAKALLA. Anchor Brocklebank Line.** Length, 445 ft.; Gross Tonnage, 6,690; Funnel: Black, White Band, Blue and White Stripe Band, Black Top.



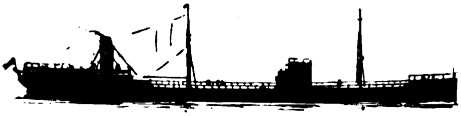
**ANTONIO LOPEZ. Compañia Trasatlantica.** Length, 440 ft.; Gross Tonnage, 5,975; Funnel: Black.



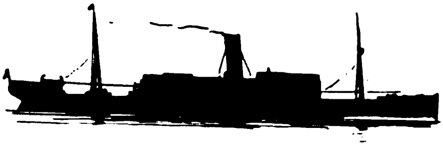
**HILDEBRAND. Booth Line.** Length, 440 ft. 3 ins.; Gross Tonnage, 6,995; Funnel: Black.



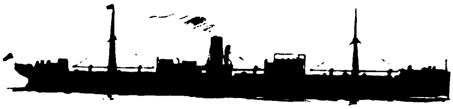
**ELYSIA. Anchor Henderson.** Length, 440 ft.; Gross Tonnage, 6,368; Funnel: Black.



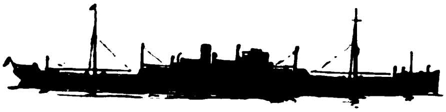
**BRITISH MERCHANT. British Tanker Co.** Length, 440 ft.; Gross Tonnage, 7,400; Funnel: Black, Two Red Bands, White Disc, B.T.C. in centre.



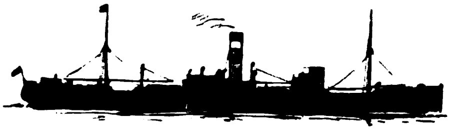
**ZEELANDIA. Koninklijke Hollandsch Lloyd.** Length, 440 ft.; Gross Tonnage, 7,995; Funnel: Yellow, Black Band.



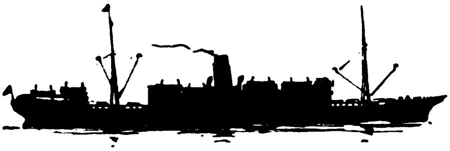
**CLAN COLQUHOUN. CLAN URQUHART. Clan Line.** **Length, 440 ft.;** Gross Tonnage, 5,856;
Funnel: Black, Two Red Bands.



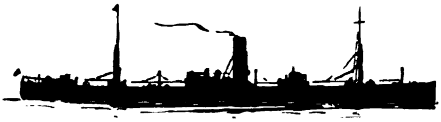
**M.S. GLENAMOY. Glen Line.** Length, 435 ft.; **Gross** Tonnage, 7,269;
Funnel: Red, Black Top.



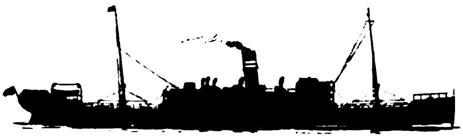
**CITY OF NORWICH. Ellerman (Hall Line).** Length, 434 ft. 4 ins.; Gross Tonnage, 6,726;
Funnel: Buff, White Band, Black Top.



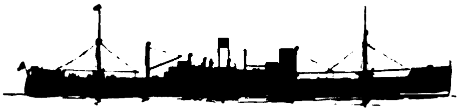
**REINA MARIA CRISTINA. Compañia Trasatlantica.** Length, 534 ft.; Gross Tonnage, 4,817;
Funnel: Black.



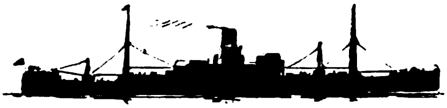
**NAGINA. British India Steam Navigation Co.** Length, 433 ft.; Gross Tonnage, 6,650;
Funnel: Black, Two White Bands.



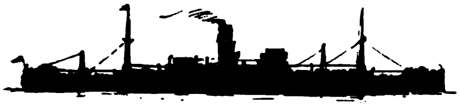
**TAKADA. TANDA. British India S.N.Co.** Length, 430 ft. 1 in.; Gross Tonnage, 6,949;
Funnel: Black, Two White Bands, Black Top.



**M.S. LEIGHTON. M.S. LINNELL. Lamport and Holt.** Length, 430 ft.; Gross Tonnage, 7,412;
Funnel: Light Blue, White Band, Black Top.

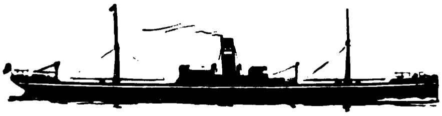


**HARDWICKE GRANGE.** Furness Withy (Houlder). Length, 430 ft. ; Gross Tonnage, 9,005 ; Funnel : Black, Red Band with White Maltese Cross, Black Top.

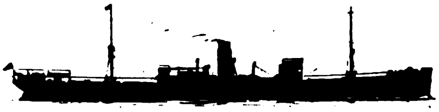


**MARQUESA.** Furness (Houlder). Length, 430 ft. ; Gross Tonnage, 8,979 ; Funnel : Black, Red Band with White Maltese Cross, Black Top.

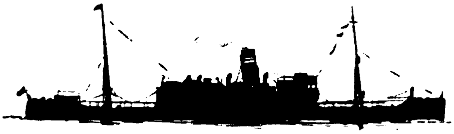
**BAYANO. CAMITO. CORONADO.** Elders and Fyffes. Length, 425 ft. 5 ins. ; Gross Tonnage, 6,788 ; Funnel : Buff, Black Top.



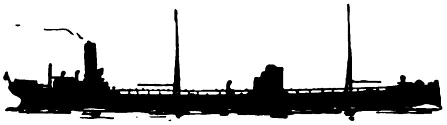
**STOCKWELL.** Anchor Brocklebank Line. Length, 425 ft. ; Gross Tonnage, 5,643 ; Funnel : Black, White Band, Blue and White Stripe Band, Black Top.



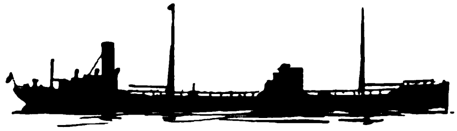
**CAIRNROSS.** Cairns, Noble & Co. Length, 425 ft. ; Gross Tonnage, 5,494 ; Funnel : Black, Red Band, White Triangle.



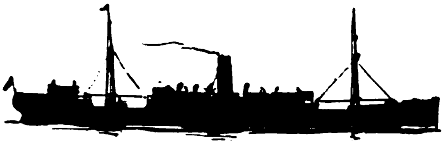
**KARAGOLA.** British India S.N. Co. Length, 425 ft. ; Gross Tonnage, 7,053 ; Funnel : Black, Two White Bands, Black Top.



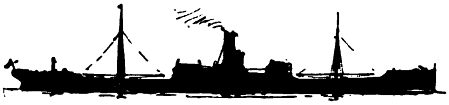
**TUSCARORA.** Anglo American Oil Co. Length, 425 ft. ; Gross Tonnage, 7,106 ; Funnel : Red, Black Top.



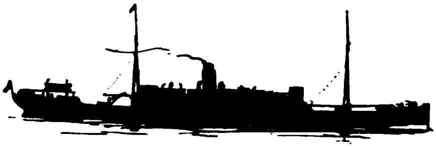
**M.S. NARRAGANSETT. M.S. SEMINOLE. Anglo American Oil Co.** Length, 425 ft.; Gross Tonnage, 6,889; Funnel: Red, Black Top.



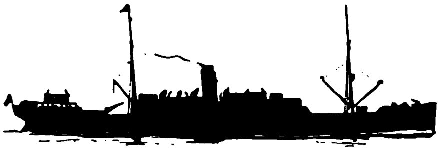
**BUENOS AIRES. Compañia Trasatlantica.** Length, 422 ft.; Gross Tonnage, 5,311; Funnel: Black.



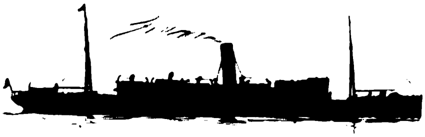
**DONGARRA. Commonwealth Government Line.** Length, 422 ft.; Gross Tonnage, 5,601; Funnel: Black.



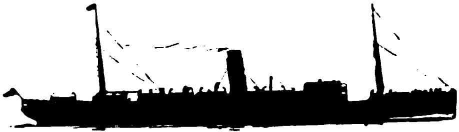
**LEON XIII. Compañia Trasatlantica.** Length, 421 ft.; Gross Tonnage, 5,086; Funnel: Black.



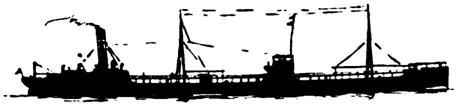
**P. DE SATRUSTEGUI. Compañia Trasatlantica.** Length, 421 ft. 10 ins.; Gross Tonnage, 4,670; Funnel: Black.



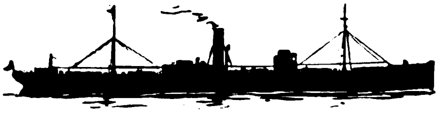
**KAROOLA. McIlwraith, McEacharn.** Length, 420 ft. 5 ins.; Gross Tonnage, 7,391; Funnel: Red, Black Top.



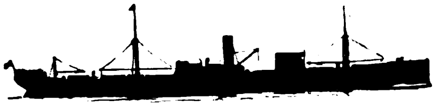
**MARAMA.** **Union Steamship Co. of N.Z.** Length, 420 ft. 3 ins. ; Gross Tonnage, 6,497 ;
Funnel : Red, Black Top.



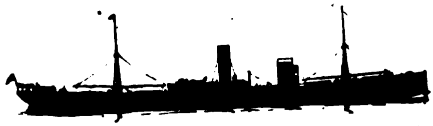
**SAN DUNSTANO. SAN EDUARDO. SAN RICARDO. SAN SILVESTRE. SAN TIRSO. SAN VALERIO. SAN ZEFERINO.** **Eagle Oil Transport Co., Ltd.**
Length, 420 ft. 2 ins. ; Gross Tonnage, 6,220 ;
Funnel : Black, Yellow Band, Black Eagle, Black O on White Band, Yellow Band.



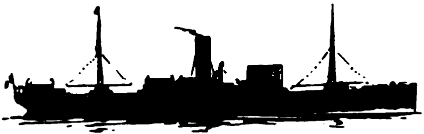
**ALNMOOR. CASTLEMOOR.** **Runciman.** Length, 420 ft. ; Gross Tonnage, 6,573 ;
Funnel : Black, White Band, Blue R.



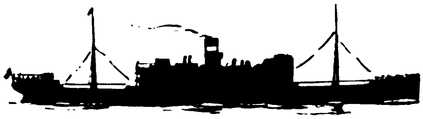
**M.S. DOMINION MILLER.** **Furness Withy.** Length, 420 ft. ; Gross Tonnage, 5,070 ;
Funnel : Black, Red Band, Black Band, Black Top.



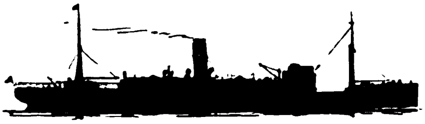
**CAIRNVALONA.** **Cairns, Noble & Co.** Length, 415 ft. 2 ins. ; Gross Tonnage, 4,929 ;
Funnel : Black, Red Band, White Triangle.



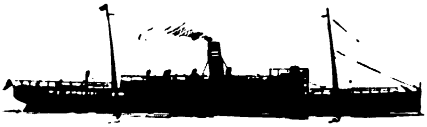
**D'ENTRECASTEAUX. FORBIN.** **Chargeurs Reunis.** Length, 415 ft. ; Gross Tonnage, 7,563 ;
**DUPLEIX.** ,, ,, ,, ,, ,, 7,418 ;
**ANGO.** ,, ,, ,, ,, 7,393 ;
**BOUGAINVILLE.** ,, ,, ,, 413 ft. ; ,, 7,293 ;
Funnel : Yellow, Red Stars on White Band.



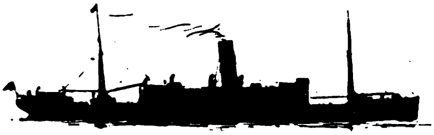
**MUNARGO.** **Munson Steamship Co.** Length, 415 ft.; Gross Tonnage, 6,484; Funnel: Blue, White Band, Black Top.



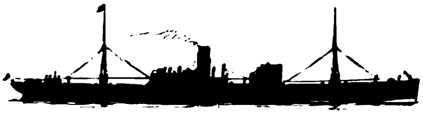
**FORT ST. GEORGE. FORT VICTORIA.** **Furness Withy.** Length, 411 ft. 3 ins.; Gross Tonnage, 7,785; Funnel: Black, Red, Thin Black and Red Bands, Black Top.



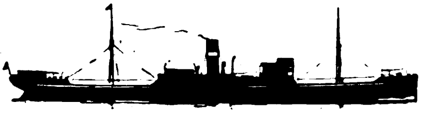
**ERINPURA.** **British India S.N. Co.** Length, 411 ft.; Gross Tonnage, 5,128; Funnel: Black, Two White Bands, Black Top.



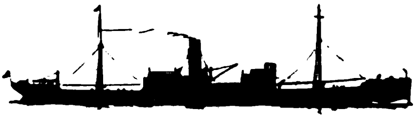
**ZEALANDIA.** **Huddart, Parker.** Length, 410 ft.; Gross Tonnage, 7,000; Funnel: Yellow.



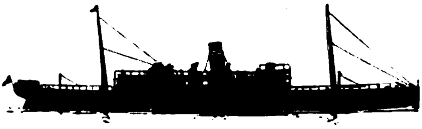
**CLAN MACNAB. CLAN MACNAIR. CLAN MACNAUGHTON. CLAN MACNEIL. CLAN MONROE. CLAN MORRISON. CLAN MURDOCH. CLAN MURRAY.** **Clan Line.** Length, 410 ft. 6 ins.; Gross Tonnage, 6,114; Funnel: Black, Two Red Bands.



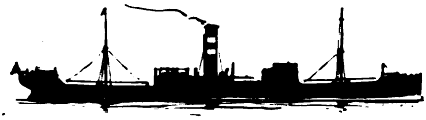
**MEDIA.** **Anchor Brocklebank.** Length, 410 ft.; Gross Tonnage, 5,437; Funnel: Black, White Band, Blue and White Stripe Band, Black Top.



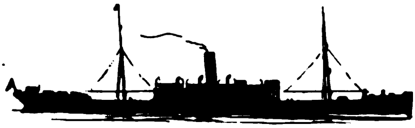
**OCEAN PRINCE. Furness Withy.** Length, 410 ft.; Gross Tonnage, 5,212; Funnel: Black, Red, Thin Black and Red Bands, Black Top.



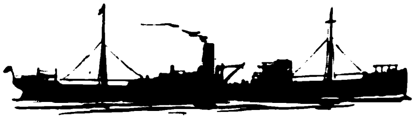
**ELLENGA. British India S.N. Co.** Length, 410 ft.; Gross Tonnage, 5,196; Funnel: Black, Two White Bands, Black Top.



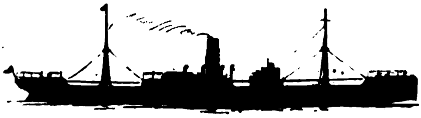
**DRAMATIST. Harrison Line.** Length, 410 ft.; Gross Tonnage, 5,443; Funnel: Black, Red Band between Two White.



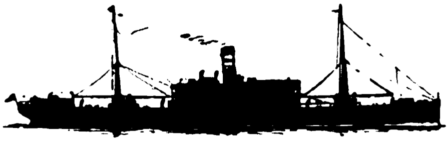
**C. LOPEZ Y LOPEZ. Compañia Trasatlantica.** Length, 408 ft.; Gross Tonnage, 4,170; Funnel: Black.



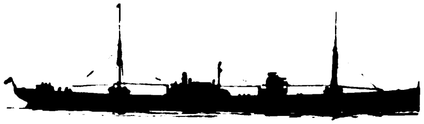
**EGBA. Elder Dempster.** Length, 406 ft.; Gross Tonnage, 4,989. Funnel: Buff.



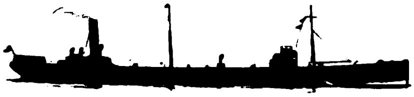
**EBOE. Elder Dempster.** Length, 405 ft. 1 in.; Gross Tonnage, 4,866; Funnel: Buff.



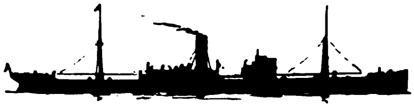
**HIGHLAND LADDIE. Nelson.** Length, 405 ft.; Gross Tonnage, 7,381;
**HIGHLAND LOCH.** „ Length, 413 ft.; Gross Tonnage, 7,493;
**HIGHLAND PIPER.** „ Length, 413 ft.; Gross Tonnage, 7,490;
Funnel: Red, Two White Bands, Black Between, Black Top.



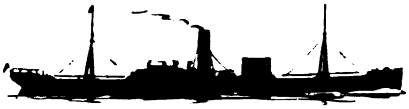
**M.S. LOUISIANA.** **Det Forenede Dampskibs Selskab.** Length, 405 ft.; Gross Tonnage, 6,518; Funnel: Flamingo Red, Black Top.



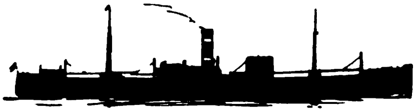
**DAGHESTAN.** **Oil Tanker.** **Hindustan Steam Shipping Co.** Length, 405 ft.; Gross Tonnage, 5,742; Funnel: Black, Two White Bands, Vermilion Between, C in White.



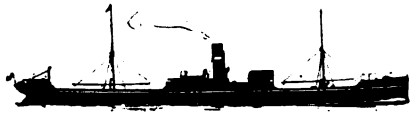
**GLENLUCE.** **GLENTARA.** **Glen Line.** Length, 405 ft.; Gross Tonnage, 6,755; Funnel: Red, Black Top.



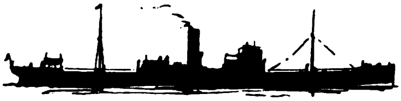
**KALIMBA.** **ROMERA.** **Maclay and McIntyre.** Length, 402 ft. 3 ins.; Gross Tonnage, 4892; Funnel: Yellow, Black Top.



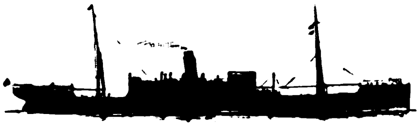
**BREDA.** **BREILLA.** **Koninklijke Nederlandsche Stoomboot Mij.** Length, 402 ft.; Gross Tonnage, 6,915; Funnel: Black, Two White Bands.



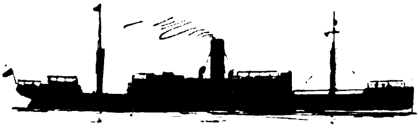
**HOLYWELL.** **Anchor Brocklebank.** Length, 401 ft. 8 ins.; Gross Tonnage, 4,867; Funnel: Black, White Band, Blue and White Stripe Band, Black Top.



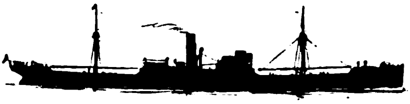
**HALIZONES.** **Houston Line.** Length, 400 ft. 8 ins.; Gross Tonnage, 5,273; Funnel: Red, Two Black Bands, Black Top.



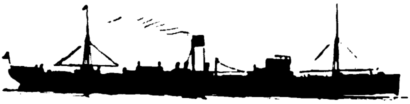
**CHALEUR.** **CHAUDIERE.** **CHIGNECTO.** **Royal Mail Steam Packet Co.** Length, 400 ft. 5 ins.; Gross Tonnage, 4,890; Funnel: Buff.



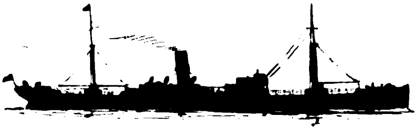
**ABINSI.** **Elder Dempster.** Length, 400 ft. 5 ins. ; Gross Tonnage, 6,365 ;
Funnel : Buff.



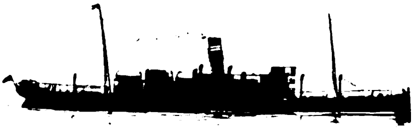
**ARIANO.** **Gulf Line.** Length, 400 ft. 4 ins. ; Gross Tonnage, 5,155 ;
Funnel : Black, Wide Red Band, Narrow Red Band Below.



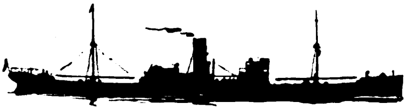
**NORWEGIAN.** **Leyland Line.** Length, 400 ft. 2 ins. ; Gross Tonnage, 6,357 ;
Funnel : Buff, Black Top.



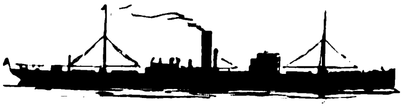
**MANISTEE. PATIA, ZENT.** **Elders and Fyffes.** Length, 400 ft. 2 ins. ; Gross Tonnage, 5,360 ;
Funnel : Buff, Black Top.



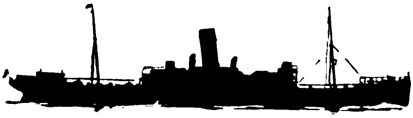
**EDAVANA, ELEPHANTA.** **British India S.N. Co.** Length, 400 ft. ; Gross Tonnage, 5,284 ;
Funnel : Black, Two White Bands, Black Top.



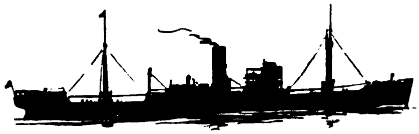
**CANADIAN VICTOR.** **Canadian Government Merchant Marine.** Length, 400 ft. ;
Gross Tonnage, 5,493 ;
Funnel : Yellow, Black Top.



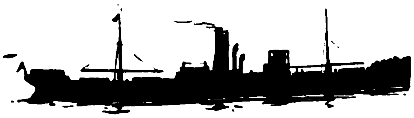
**MIN.** **Edwd. Hain & Son, Ltd.** Length, 400 ft. ; Gross Tonnage, 4,700 ;
Funnel : Black, White "H" on side.



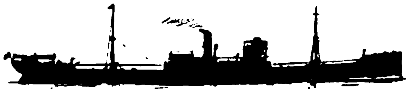
**ANSELM.** **Booth Line.** Length, 400 ft. ; Gross Tonnage, 5,450 ;
Funnel : Black.



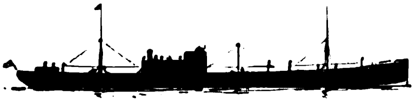
**M.S. DOLIUS.** **Blue Funnel Line.** Length, 400 ft. ; Gross Tonnage, 5,700 ;
Funnel : Blue, Black Top.



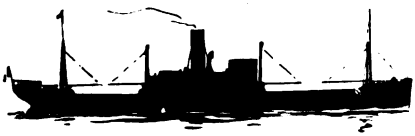
**ORANGEMOOR.** - **Runciman.** Length, 399 ft. 6 ins. ; Gross Tonnage, 6,573 ;
Funnel : Black, White Band, Blue R.



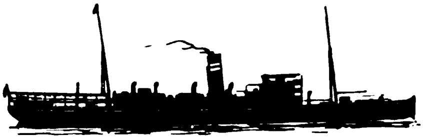
**CAIRNDHU.** **Cairns, Noble & Co.** Length, 399 ft. 3 ins. ; Gross Tonnage, 5,250 ;
**CAIRNGOWAN.** ,, ,, Length, 400 ft. ; Gross Tonnage, 5,295 ;
Funnel : Black, Red Band, White Triangle.



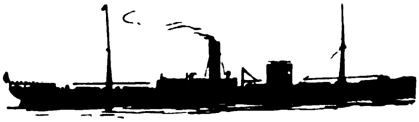
**M.S. LULE.** **Grängesberg Oxelösund Co.** Length, 399 ft. ; Gross Tonnage, 5,630 ;
Funnel : Buff, Blue Band, Gold Emblem.



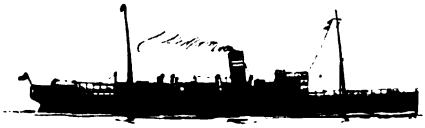
**BAOULE.**
**CASAMANCE.** } **Chargeurs Reunis.** Length, 391 ft. ; Gross Tonnage, 5,900 ;
**DAHOMEY.**
**ADRAR.** ,, ,, ,, ,, ,, ,, 5,355 ;
Funnel : Yellow, Red Stars on White Band.



**ANGORA.** **British India S.N. Co.** Length, 390 ft. 8 ins. ; Gross Tonnage, 4,298 ;
Funnel : Black, Two White Bands, Black Top.

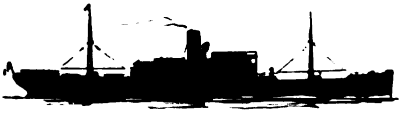


**CAIRNMONA.** **Cairns, Noble & Co.** Length, 390 ft. 2 ins. ; Gross Tonnage, 4,666 ;
Funnel : Black, Red Band, White Triangle.

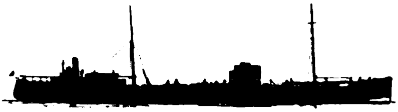


**ARONDA.** **British India S.N. Co.** Length, 390 ft. 2 ins.; Gross Tonnage, 4,062; Funnel: Black, Two White Bands, Black Top.

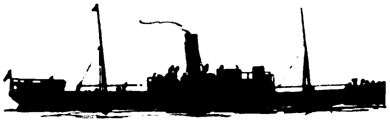
**VARELA. VARSOVA. VITA. British India S.N. Co.** Length, 390 ft. 1 in.; Gross Tonnage, 4,645; Funnel: Black, Two White Bands, Black Top.



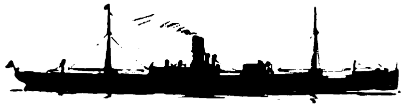
**AMIRAL LATOUCHE. AMIRAL NEILLY. AMIRAL PONTY. AMIRAL TREVILLE.** **Chargeurs Reunis.** Length, 389 ft. 5 ins.; Gross Tonnage, 5,582; Funnel: Yellow, Red Stars on White Band.



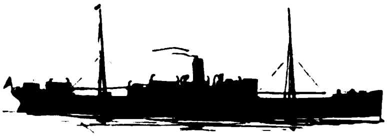
**OLJAREN.** **Transatlantic S.S. Co.** Length, 389 ft.; Gross Tonnage, 5,450; Funnel: Yellow, Black Top.



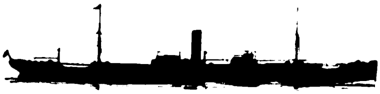
**LEGAZPI.** **Compañia Trasatlantica.** Length, 380 ft.; Gross Tonnage, 4,339; Funnel: Black.



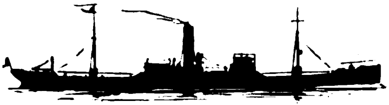
**COOEE.** **Australian Commonwealth Line.** Length, 387 ft. 8 ins.; Gross Tonnage, 4,255; Funnel: Black.



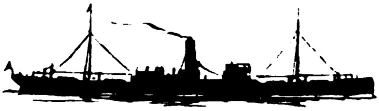
**MONTSERRAT.** Compañia Trasatlantica. Length, 386 ft. 1 in.; Gross Tonnage, 3,994; Funnel: Black.



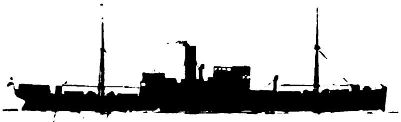
**SCATWELL.** Cairns, Noble & Co. Length, 385 ft.; Gross Tonnage, 4,425; Funnel: Black, Red Band, White Triangle.



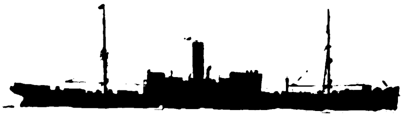
**HALESIUS.** Houston Line. Length, 385 ft.; Gross Tonnage, 4,652; Funnel: Red, Two Black Bands, Black Top.



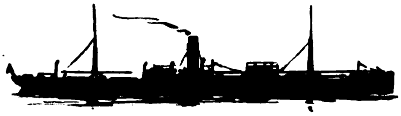
**HESPERIDES.** Houston Line. Length, 382 ft. 5 ins.; Gross Tonnage, 3,914; Funnel: Red, Two Black Bands, Black Top.



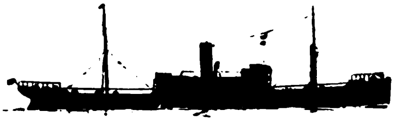
**DENIS. STEPHEN.** Booth Line. Length, 376 ft. 4 ins.; Gross Tonnage, 4,435; Funnel: Black.



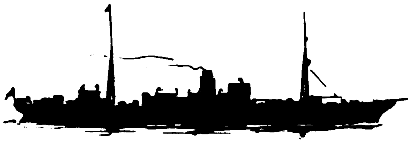
**AIDAN.** Booth Line. Length, 375 ft. 9 ins.; Gross Tonnage, 4,545; Funnel: Black.



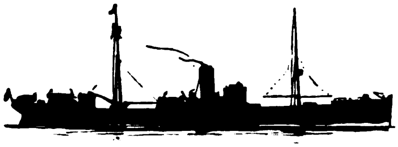
**PARATTAH.** **Australian Commonwealth Line.** Length, 375 ft. 6 ins. ; Gross Tonnage, 4,229 ; Funnel : Black.



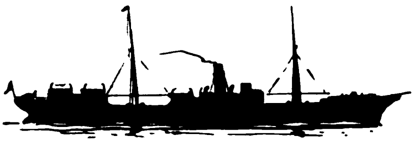
**ALBAN.** **Booth Line.** Length, 375 ft. 2 ins. ; Gross Tonnage, 5,223 ; Funnel : Black.



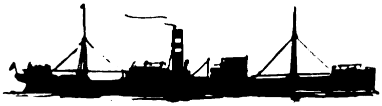
**CUIDAD DE CADIZ.** **Compañia Trasatlantica.** Length, 375 ft. ; Gross Tonnage, 3,202 ; Funnel : Black.



**ISLA DE PANAY.** **Compañia Trasatlantica.** Length, 373 ft. ; Gross Tonnage, 3,484 ; Funnel : Black.

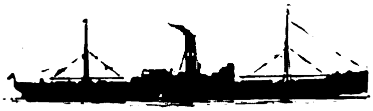


**ALICANTE.** **Compañia Trasatlantica.** Length, 372 ft. 2 ins. ; Gross Tonnage, 3,879 ; Funnel : Black.

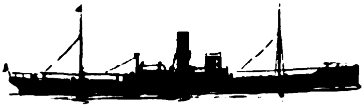


**SPEAKER.** **Harrison Line.** Length, 370 ft. ; Gross Tonnage, 4,264 ; Funnel : Black, Red Band between Two White.

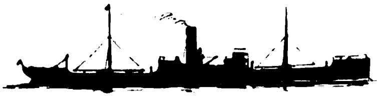
**EUROPE. Chargeurs Reunis.** Length, 369 ft.; Gross Tonnage, 5,453;
Funnel: Yellow, Red Stars on White Band.



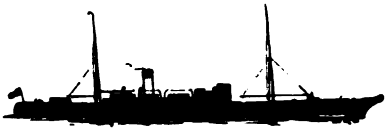
**SANTA AURORA. Eagle Oil Transport Co., Ltd.** Length, 367 ft. 5 ins.; Gross Tonnage, 4,278;
Funnel: Black, Yellow Band, Black Eagle, Black O on White Band, Yellow Band.



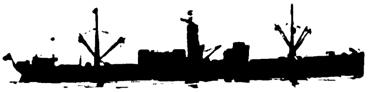
**HESIONE. Houston Line.** Length, 361 ft. 7 ins.; Gross Tonnage, 4,125;
Funnel: Red, Black Top.



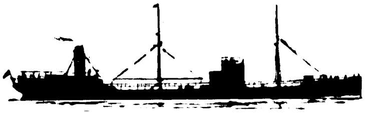
**TOROMEO. Australian Commonwealth Line.** Length, 360 ft.; Gross Tonnage, 4,149;
Funnel: Black.



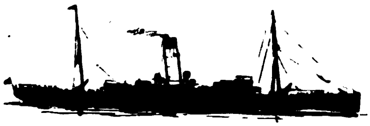
**JOHN W. MACAY. Commercial Cable Co., N.Y.** Length, 360 ft.; Gross Tonnage, 4,049;
Funnel: Buff, Black Top.



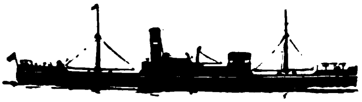
**CUTHBERT. JUSTIN. Booth Line.** Length, 355 ft. Gross Tonnage, 3,843;
Funnel: Black.



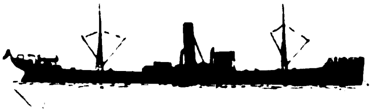
**BRITISH COMMERCE. BRITISH ENTERPRISE. BRITISH TRADER. British Tanker Co.**
Length, 351 ft. 4 ins.; Gross Tonnage, 4,205;
Funnel: Black, Two Red Bands, White Disc, B.T.C. in centre.



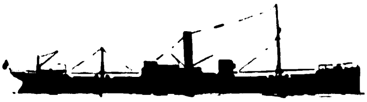
**REGELE CAROL I.** **Roumanian State.** Length, 350 ft. ; Gross Tonnage, 2,370; Funnel : White, Black Top.



**M.S. MALIA.** **Anchor Brocklebank.** Length, 350 ft. 5 ins. ; Gross Tonnage, 3,872 ; Funnel : Black, White Band, Blue and White Striped Band, Black Top.

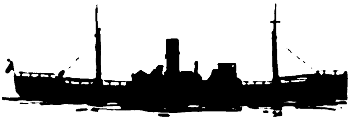


**BENEDICT.** **Booth Line.** Length, 345 ft. ; Gross Tonnage, 3,457 ; Funnel : Black.

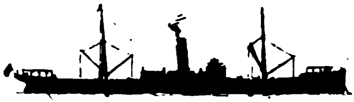


**POLYCARP.** **Booth Line.** Length, 340 ft. 7 ins. ; Gross Tonnage, 3,577 ; Funnel ; Black.

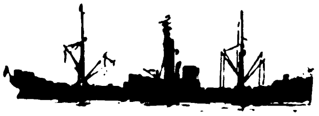
**BARODA.** **British India S.N. Co.** Length, 330 ft. 4 ins. ; Gross Tonnage, 3,172 ; Funnel : Black, Two White Bands, Black Top.



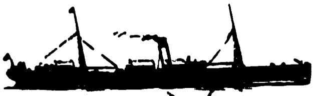
**LA MAREA. LA PERLA. LA PLAYA.** **United Fruit Co.** Length, 325 ft. ; Gross Tonnage, 3,830 ; Funnel : Buff, White Diamond on Red Bank, Black Top.



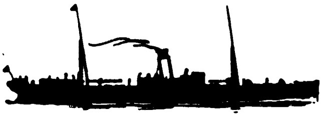
**DOMINIC. DUNSTAN.** **Booth Line.** Length, 322 ft. ; Gross Tonnage, 2,966 ; Funnel : Black.



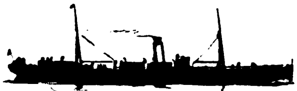
**MICHAEL.** **Booth Line.** Length, 300 ft. 5 ins. ; Gross Tonnage, 3,172 ; Funnel : Black.



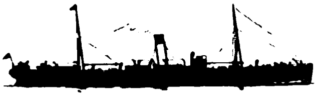
**SLIEVEBAWN. SLIEVEMORE.** London, Midland and Scottish Railway.
Length, 300 ft. 2 ins. ; Gross Tonnage, 1,061 ;
Funnel : Yellow, Black Top.



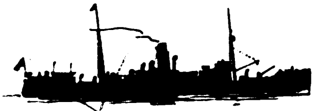
**SLIEVE DONARD.** London, Midland and Scottish Railway.
Length, 300 ft. ; Gross Tonnage, 1,116 ;
Funnel : Yellow, Black Top.



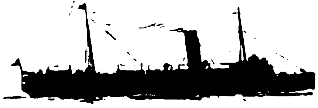
**SNOWDEN.** London, Midland and Scottish Railway. Length, 299 ft. 9 ins. ; Gross Tonnage, 1021 ;
**SOUTH STACK.** „ „ Length, 299 ft. ; Gross Tonnage, 977 ;
Funnel : Yellow, Black Top.



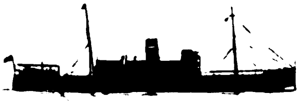
**SLIEVEGALLION.** London, Midland and Scottish Railway.
Length, 299 ft. 5 ins. ; Gross Tonnage, 1,071 ;
Funnel : Yellow, Black Top.



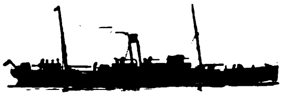
**SAN CARLOS.** Compañia Trasatlantica. Length, 291 ft. ; Gross Tonnage, 2,491 ;
Funnel : Black.



**PRINCESS ADELAIDE.** Canadian Pacific. Length, 290 ft. 5 ins. ; Gross Tonnage, 3,061 ;
Funnel : Yellow.

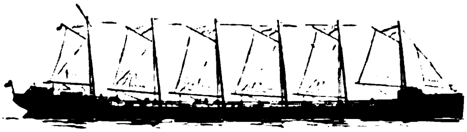


**M.S. DUMRA.** British India S.N. Co. Length, 280 ft. ; Gross Tonnage, 2,000 ;
Funnel : Black, Two White Bands, Black Top.



**GALTEE MORE. ROSSTREVOR.** London, Midland and Scottish Railway.
Length, 276 ft. 1 in. ; Gross Tonnage, 1,112 ;
Funnel : Yellow, Black Top.

**CADILLAC. SARANAC. Anglo American Oil Co.** Length, 530 ft. 2 ins.; Gross Tonnage, 12,074; Funnel: Red, Black Top.



**BARGE NAVAHOE. Anglo American Oil Co.** Length, 450 ft.; Gross Tonnage, 7,718.

# DIMENSIONS AND PARTICULARS
# OF
# BRITISH AND FOREIGN WARSHIPS.

# LIST OF BRITISH AND FOREIGN SHIPS.

The following abbreviations are used throughout the Alphabetical List:—

| | | | |
|---|---|---|---|
| a.c. | Armoured cruiser. | g.v. | Gun-vessel. |
| | | H.A. | High angle = A.A. Anti-aircraft. |
| | | H.N.S. | Harvey nickel steel. |
| a.g.b. | Armoured gunboat. | H.S. | Harveyised or similar hard-faced steel. |
| b. | Battleship. | | |
| b.c. | Battle-cruiser. | K.S. | Krupp steel. |
| l.cr. | Light cruiser. | | |
| Flot. ldr. | Flotilla leader. | | |
| c.d.s. | Coast-defence ship. | p.v. | Patrol vessel. |
| P. L. Cr. | Protected light cruiser. | *t.* | Turret-ship (in class column). |
| M.Cr. | Minelaying cruiser. | *t.* | Speed and H.P. at trials (in speed and H.P. columns). |
| cr. | Cruiser. | | |
| A.A. | Anti-aircraft guns. (H.A. = High angle) | A.C. | Aircraft carrier. |
| | | to.cr. | Torpedo-cruiser. |
| g.b. | Gunboat. | to.g.b. | Torpedo-gunboat. |

| | |
|---|---|
| l. | Light guns under 15 cwt., including boats' guns. |
| M. | Machine guns. |
| sub. | Submerged torpedo tube. |

The following abbreviations are used to distinguish the various types of boilers:—

| | | | |
|---|---|---|---|
| W.T. | Water-tube boilers, where the type is not known. | My. | Myabara. |
| B. | Belleville. | N. or Nic. | Niclausse. |
| Bl. | Blechynden. | Nor. | Normand. |
| B. & W. | Babcock and Wilcox. | N.S. | Normand-Sigaudy. |
| D'A. | D'Allest. | T. | Thornycroft. |
| | | T.S. | Thornycroft-Schulz. |
| | | $Y^1$. | Yarrow small tube. |
| | | $Y^2$. | Yarrow large tube. |

The following abbreviations distinguish types of turbines:—

| | | | |
|---|---|---|---|
| P.T. | Parsons. | C.T. | Curtis. |
| (G.) | Geared turbines. | B.C.T. | Brown-Curtis. |

A reference is now given in the tables to the pages on which diagrams of the ships appear.

# GREAT BRITAIN.—Armoured Ships.

| Class. | NAME.<br>DATE FOR SCRAPPING. | Displacement. | Length. | Beam (Extreme.) | | Draught. | | Horse-Power. | Where Built. | Makers of Engines. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Fuel.<br>Coal.<br>Oil. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position.<br>Heavy Guns. | Gun Position.<br>Second-ary. | Guns. | Torpedo Tubes. | | | |
| | | tons | ft. | ft. | ins. | ft. | ins. | | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons | |
| b. | **Ajax** .<br>1925 *See p. 446.* | 23,000 | 555 | 89 | 0 | 27 | 6 | 28,000<br>B. & W. | Greenock | Scott<br>P.T. | 1912 | 1913 | 1,937,631* | 12–6 | .. | 9 | .. | 10 | 3·1 | 10 *13·5-in.*, 12 *4-in.*, 4 *3-pr.*, 5 M.; 10 L. | 2 | 21<br>*t* | 3150<br>850 | 1135 |
| b. | **Barham** .<br>1935 *See p. 444.* | 27,500 | 580 | 90 | 6 | 28 | 9 | 75,000<br>B. & W. | Clydeb'nk | J. Brown<br>B.C.T. | 1914 | 1915 | .. | 13–6 | 3–1 | 6 | 4–2 | 10 | 6 | 8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in* A.A.; 5 M.; 10 L. | 4 | 25 | Oil<br>3400 | 1279 |
| b. | **Benbow** .<br>1934 *See p. 445.* | 25,000 | 580 | 90 | 0 | 28 | 0 | 29,000<br>B. & W. | Dalmuir . | Beardmore<br>P.T. | 1913 | 1914 | 2,027,115* | 12–8 | 1–2½ | 9–8 | 1–1½ | 10 | 6 | 10 *13·5-in.*, 12 *6-in.*. 4 *3-pr.* 2 *3-in.* A.A.; 5 M.; 10 L. | 4 | 21 | 3250<br>1050<br>Oil | 1213 |
| b. | **Centurion** .<br>1925 *See p. 446.* | 23,000 | 555 | 89 | 0 | 27 | 6 | 28,200<br>Y$^2$ | Devonp'rt | Hawthorn<br>P.T. | 1911 | 1913 | 1,939,648* | 12–6 | .. | 9 | .. | 10 | 3·1 | 10 *13·5-in.*, 12 *4-in.*, 4 *3-pr.*; 5 M.; 10 L. | 2 | 21<br>*t* | 3150<br>850 | 1135 |
| b. | **Emperor of India** .<br>1934 *See p. 445.* | 25,000 | 580 | 90 | 0 | 28 | 0 | 29,000<br>Y. | Barrow . | Vickers<br>P. T. | 1913 | 1914 | 2,020,017* | 12–8 | 1–2½ | 9–8 | 1–1½ | 10 | 6 | 10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M.; 10 L. | 4 | 21 | 3250<br>1050<br>Oil. | 1195 |
| b.c. | **Hood** .<br>1941 *See p. 448.* | 41,200 | 810 | 105 | 2½ | 28 | 6 | 144,000 | Clydeb'k | J. Brown<br>B.C.T. (G.) | 1918 | 1920 | 5,843,039* | 12–6 | 3–1 | 7–5 | 5–4 | 15–11 | (*a*) | 8 *15-in.*, 12 *5·5-in.*, 4 *4-in.* A.A., 4 *3-pr.* | 4<br>(deck)<br>2<br>(sub.) | 31 | 4000<br>Oil | 1482 |
| b. | **Iron Duke** .<br>1934 *See p. 445.* | 25,000 | 580 | 90 | 0 | 28 | 0 | 29,000<br>B. & W. | Portsm'th | Cammell<br>Laird<br>P.T. | 1912 | 1914 | 2,080,918 | 12–8 | 1–2½ | 9–8 | 1–1½ | 10 | 6 | 10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.* 2 *3-in.* A.A.; 5 M.; 10 L. | 4 | 21<br>*t* | 3250<br>1050<br>Oil | 1235 |
| b. | **King George V.** .<br>1925 *See p. 446.* | 23,000 | 555 | 89 | 0 | 27 | 6 | 28,005<br>B. & W. | Portsm'th | Parsons<br>P.T. | 1911 | 1912 | 1,965,413* | 12–6 | .. | 9 | .. | 10 | 3·1 | 10 *13·5-in.*, 12 *4-in.*, 4 *3-pr.* 5 M.; 10 L. | 2 | 21<br>*t* | 2870<br>850 | 1133 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| b. | **Malaya**¶ .<br>1934 *See p.* 444. | 27,500 | 580 | 90 | 9 | 28 | 9 | 75,000<br>B. & W. | Walker . | Wallsend .<br>P. T. | 1915 | 1916 | ¶ | 13–6 | 3–1 | 6 | 4–2 | 10 | 6 | 8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M.; 10 L. | 4 | 25 | Oil·<br>3400 | 1234 |
| b. | **Marlborough** .<br>1934 *See p.* 445. | 25,000 | 580 | 90 | 0 | 28 | 0 | 29,000<br>Y² | Devonport | Hawthorn<br>P.T. | 1912 | 1914 | 2,043,437 | 12–8 | 1–2½ | 9–8 | 1–1½ | 10 | 6 | 10 *13·5-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M; 10 L. | 4 | 21<br>*t* | 3250<br>1050<br>Oil | 1193 |
| b. | **Nelson** .<br>1942 | 35,000 | 702 | 106 | 0 | 30 | 0 | .. | N'wc'stle-on-Tyne | Wallsend . | Bldg. | .. | .. | .. | .. | .. | .. | .. | .. | *16-in.* . . . . . . . | .. | .. | .. | .. |
| b. | **Queen Elizabeth**<br>1935 *See p.* 444. | 27,500 | 580 | 90 | 6 | 28 | 9 | 75,000<br>B. & W. | Portsm'th | Wallsend .<br>P.T. | 1913 | 1915 | .. | 13–6 | 3–1 | 6 | 4–2 | 10 | 6 | 8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M.; 10 L. | 4 | 25 | Oil<br>3400 | 1299 |
| b | **Ramillies** .<br>1941 | 25,750 | 580 | 101 | 6 | 25 | 6 | 40,000<br>Y. | Dalmuir . | Beard-more, P.T. | 1916 | 1917 | .. | 13–6 | 4–1 | 6 | 6–4 | 11 | 6 | 8 *15-in.*, 14 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M.; 10 L. | 4 | 23 | 3250<br>Oil | 1201 |
| b. | **Resolution**<br>1937 *See p.* 443. | | | ‡101 | 4 | 26 | 3 | | Jarrow . | Palmer .<br>P.T. | 1915 | 1916 | | | | | | | | | | | | |
| b. | **Revenge** .<br>1937 | 25,750 | 580 | ‡101 | 5 | 26 | 3 | 40,000<br>Y. | Barrow . | Vickers .<br>P.T. | 1915 | 1916 | .. | 13–6 | 4–1 | 6 | 6–4 | 11 | 6 | 8 *15-in.*, 14 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M; 10 L. | 4 | 23 | 3250<br>Oil. | 1219 |
| b. | **Royal Oak**<br>1938 | | | ‡102 | 1 | 25 | 6 | | Devonp'rt | Hawthorn<br>P.T. | 1914 | 1916 | 2,468,269 | | | | | | | | | | | 1201 |
| b. | **Royal Sovereign**<br>1936 *See p.* 443. | | | ‡102 | 0 | 26 | 3 | | Portsm'th | Parsons .<br>P.T. | 1915 | 1916 | 2,570,929 | | | | | | | | | | | 1201 |
| b.c. | **Renown** .<br>1940 | 26,500 | 750 | 90 | 0 | 25 | 6 | 112,000<br>B. & W. | Govan | Fairfield .<br>B.C.T. | 1916 | 1916 | 3,111,284 | 6–3<br>K.C. | 2 | 6 3 | 4·3 | 9–7<br>K.C. | 6<br>K.C. | 6 *15-in.*, 17 *4-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M.; 10 L. | 2† | 31·5 | 1250<br>Oil. | 1240 |
| b.c. | **Repulse** .<br>1939 *See p.* 449. | | | 102 | 8 | 23 | 3 | | Clydeb'nk | J. Brown .<br>B.C.T. | 1916 | 1916 | 2,760,062 | | | | | | | | | | | |
| b. | **Rodney** .<br>1942 | 35,000 | 702 | 106 | 0 | 30 | 0 | .. | Birkenh'd | Cammell<br>Laird | Bldg. | .. | .. | .. | .. | .. | .. | .. | .. | *16-in.* . . . . . | .. | .. | .. | .. |
| b. | **Thunderer** .<br>1925 *See p.* 447. | 22,500 | 545 | 88 | 6 | 27 | 6 | 27,604<br>B. & W. | Blackwall | Thames Ironworks<br>P. T. | 1911 | 1912 | 1,889,920* | 12 | .. | 9 | .. | 10 | Nil. | 10 *13·5-in.*, 8 *4-in.*, 1 *3-in.* A.A., 4 *3-pr.*; 5 M.; 10 L. | 2 | 21 | 3300<br>800 | 1110 |

* Total estimated cost of ship including guns.

† Repulse has also 8 above-water torpedo tubes.

‡ Over rubbers.

¶ Built at the charge of the Federated Malay States

(*a*) Guns are in shields of 1-in. H.T. plating.

## GREAT BRITAIN.—Armoured Ships—*continued.*

| Class. | NAME. DATE FOR SCRAPPING. | Displacement. | Length. | Beam. (Extreme.) | Draught. | Horse-Power. | Where Built. | Maker of Engines. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Fuel. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. | | Guns. | Torpedo Tubes. | | Coal.<br>Oil. | |
| | | | | | | | | | | | | | | | | Heavy Guns. | Second-ary. | | | | | |
| | | tons. | ft. | ft. ins. | ft. ins. | | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *b.c.* | **Tiger**<br>1935 *See p.* 450. | 28,500 | 660 | 90 6 | 28 6 | 108,000<br>B. & W. | Clydeb'nk | J. Brown<br>B. C. T. | 1913 | 1914 | 2,500,000* | 9–3 | 3–1 | 6 | 4–2 | 9 | 6 | 8 *13·5-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M.; 10 L. | 4 | 30 | †2800<br>3480 | 1110 |
| *b.* | **Valiant**<br>1939 *See p.* 444. | 27,500 | 580 | 90 6 | 28 9 | 75,000<br>B. & W. | Govan | Fairfield<br>B. C. T. | 1914 | 1916 | .. | 13–6 | 3–1 | 6 | 4–2 | 10 | 6 | 8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M.; 10 L. | 4 | 25 | Oil<br>3400 | 1234 |
| *b.* | **Warspite**<br>1935 *See p.* 444. | 27,500 | 580 | 90 6 | 28 9 | 75,000<br>B. & W. | Devonp'rt | Hawthorn<br>P.T. | 1913 | 1915 | .. | 13–6 | 3–1 | 6 | 4–2 | 10 | 6 | 8 *15-in.*, 12 *6-in.*, 4 *3-pr.*, 2 *3-in.* A.A.; 5 M.; 10 L. | 4 | 25 | Oil<br>3400 | 1234 |

* Total estimated cost of ship, including guns.

† Total fuel carried not to exceed 4900 tons.

The dates placed under the names of ships indicate the years in which they are to be scrapped according to the Washington Treaty.

The following ship is in the non-effective category: Agamemnon, battleship, Fleet target service.

The battle-cruiser Lion has been removed from the effective list, and although retained temporarily out of commission at Rosyth, is to be disposed of under the Washington Treaty.

## River Gunboats.

Two classes of river gunboats were added to the Navy during the war. The larger class has a displacement of 640 tons, length 230 ft., beam 36 ft., draught 4 ft., H.P. 2,000, speed 14 knots, armament, two 6-in., two 12-prs., six M.; fuel capacity, coal 35, oil 54 tons. Names:—Aphis, Bee, Cicala, Cockchafer, Cricket, Glowworm, Gnat, Ladybird, Mantis, Moth, Scarab and Tarantula. The smaller class has been scrapped. Older vessels of this category still remaining in commission are the Moorhen, Robin, Teal, Widgeon, Woodcock, and Woodlark.

# GREAT BRITAIN.—Cruising Ships, &c.

| Class. | NAME. | Displacement. | Length. | Beam. (Extreme.) | Draught. | Horse-Power. | Where Built. | Maker of Engines. | Date of Launch. | Date of Completion. | Cost. | Armour. Belt. / Deck. | Armour. Gun Position. | Armament. Guns. | Armament. Torpedo Tubes. | Speed. | Fuel. Coal. / Oil. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tons. | ft. | ft. ins. | ft. ins. | | | | | | £ | in. | in. | | | knots. | tons. | |
| M.Cr. | **Adventure** | — | — | — | — | — | Devonp'rt | Vickers | — | Bldg. | .. | .. | .. | .. | .. | .. | . | .. |
| A C. | **Argus** | 14,450 | 565 | *68 8 | 21 0 | 20,000 | Dalmuir | Beardmore T. | 1917 | 1918 | .. | .. | .. | 2 *4-in.*, 4 *4-in.* A.A., 4 *3-pr.*, 4 M., 10 L. | .. | 20¾ | 2000 | 401 |
| A.C. | **Ark Royal** | 7080 | 366 | 50 10 | 17 6 | 3000 | Blyth | Blyth S. B. Co. | 1914 | 1914 | .. | .. | .. | 4 *12-pr.*, 4 M., 10 L. | . | 11 | 500 Oil. | 139 |
| Cr. | **Berwick** | — | — | — | — | — | Govan | Fairfield | — | Bldg. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cr. | **Cornwall** | — | — | — | — | — | Devonp'rt | Hawthorn. Leslie | — | Bldg. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cr. | **Kent** | — | — | — | — | — | Chatham | Beardmore | — | Bldg. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cr. | **Suffolk** | — | — | — | — | — | Portsmouth | Parsons | — | Bldg. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cr. | **Cumberland** | — | — | — | — | — | Barrow | Vickers | — | Bldg. | .. | .. | .. | .. | .. | .. | .. | .. |
| Cr. | **Birmingham**<br>*See p.* 457. | 5440 | 430 | 49 10 | 15 10 | 26,500 | Elswick | Hawthorn. T. | 1913 | 1914 | 353,437* | .. | .. | 9 *6-in.*, 4 *3-pr.*, 1 *3-in.* A.A., 2 M., 8 L. | 2 | 25·5 | 1120<br>260 | 549 |
| L. Cr. | **Courageous** (a) | 18,600 | 735 | 81 0 | 22 3 | 90,000 | Walker (Armstr'g) | Parsons P.T.(G.) | 1916 | 1917 | .. | 3 | 9–7 | 4 *15-in.*, 18 *4-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 5 M.; 10 L. | 2<br>12 | 31 | Oil<br>3250 | 1146 |
| ” | **Glorious** (a)<br>*See p.* 451. | | | | | Y. | Belfast | Harland & Wolff T.(G.) | | | | | | | | | | |
| A.C. | **Furious** | 19,100 | 735 | 88 0 | 21 6 | 90,000 | Walker (Armstrong) | Wallsend Engn'g Co. T.(G.) | 1916 | 1917 | 1,920,000† | 3 | 7 | 10 *5·5-in.*, 5 *3-in.* A.A., 2 *3-pr.*, 14 M. | 2<br>16 | 31 | Oil<br>3400 | 1146 |

(a) To be converted into an aircraft carrier.

* Extreme breadth under water. Breadth over lifeboat stowages is 110 ft. 5 ins.

## GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

| Class. | NAME. | Displacement. | Length. | Beam. (Extreme.) | | Draught. | | Horse-Power. | Where Built. | Maker of Engines. | Date of Launch. | Date of Completion. | Cost. | Armour. | | Armament. | | Speed. | Fuel. Coal. Oil. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Belt. Deck. | Gun Position. | Guns. | Torpedo Tubes. | | | |
| | | tons. | ft. | ft. | ins. | ft. | ins. | | | | | | £ | in. | in. | | | knots. | tons. | |
| P. L. Cr. | **Calliope** | 3750 | 420 | 41 | 6 | 13 | 6 | 40,000 | Chath'm | Parsons P.T. (G.) | 1914 | 1915 | .. | 3 | .. | 4 *6-in.*, 2 *3-in.* A.A.‡ 2 *2-pr.* Pom Poms; 1 M.; 8 L. | 4 § | 29 | Oil.<br>805 | 368 |
| „ „ | **Carysfort** | | | | | | | | Pembroke | Hawthorn. B.C.T. | 1914 | 1915 | | | | | | | 917 | 379 |
| „ „ | **Champion** | | | | | | | | Newcastle (Hawth'rn) | Hawthorn. P.T. (G.) | 1914 | 1915 | | | | | | | 895 | 368 |
| „ „ | **Cleopatra** | | | | | | | | Devonport | Cammell Laird P.T. | 1914 | 1915 | | | | | | | 917 | 368 |
| „ „ | **Comus** | | | | | | | | Newcastle (Swan Hunter) | Wallsend Engn'g Co. P.T. | 1914 | 1915 | | | | | | | 917 | 368 |
| „ „ | **Conquest** *See p.* 456. | | | | | | | | Chatham | Scotts' P.T. | 1914 | 1915 | | | | | | | 917 | 381 |
| „ „ | **Cairo** | 4190 | 425 | 43 | 6 | 14 | 1 | 40,000 | Birken-head | Cammell Laird T.(G.) | 1918 | 1919 | .. | 3 | .. | 5 *6-in.*, 2 *3-in* A.A., 4 *3-pr.*; 2 *2-pr.* Pom Poms. | 8 | 29 | Oil<br>950 | 432 |
| „ „ | **Calcutta** | | | | | | | | Barrow | Vickers T.(G.) | 1918 | 1919 | | | | | | | | |
| „ „ | **Cape Town** | | | | | | | | Birken-head | Cammell Laird T.(G.) | 1919 | 1922 | | | | | | | | |
| „ „ | **Carlisle** | | | | | | | | Govan | Fairfield T.(G.) | 1918 | 1918 | | | | | | | | |
| „ „ | **Colombo** *See p.* 455. | | | | | | | | Govan | Fairfield T.(G.) | 1918 | 1919 | | | | | | | | |
| „ „ | **Caledon** | 4120 | 425 | 42 | 9 | 14 | 1 | 40,000 | Birken-head | Cammell Laird T.(G.) | 1916 | 1917 | 300,000 | 3 | .. | 5 *6-in.*, 2 *3-in.* A.A., 4 *3-pr.*; 2 *2-pr.* Pom Poms; 2 M.; 8 L. | 8 | 29 | Oil<br>935 | 440 |
| „ „ | **Calypso** | | | | | | | | Glasgow | Scotts' T.(G.) | 1917 | | | | | | | | | |
| „ „ | **Caradoc** *See p.* 455. | | | | | | | | Barrow | Vickers T.(G.) | 1916 | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P. L. Cr. | **Cambrian** | 3750 | 420 | 41 | 6 | 13 | 6 | 40,000 | Pembroke | Cammell Laird T. | 1916 | 1916 | 300,000† | 3 | .. | 4 | *6-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 2 *2-pr.*, Pom Poms; 1 M.; 8 L. | 2 | 29 | Oil<br>841 | 368 |
| " " | **Canterbury** | | | | | | | | Clydebank | J. Brown T. | 1915 | 1916 | | | | | | | | | |
| " " | **Castor** | | | | | | | | Birkenhead | Cammell Laird T. | 1915 | 1915 | | | | | | | | | |
| " " | **Constance**. *See p. 456.* | | | | | | | | Birkenhead | Cammell Laird T. | 1915 | 1916 | | | | | | | | | |
| " " | **Cardiff** | 4190 | 425 | 43 | 6 | 14 | 1 | 40,000 | Govan | Fairfield T.(G.) | 1917 | 1917 | .. | 3 | .. | 5 | *6-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 2 *2-pr.* Pom Poms. | 8 | 29 | Oil<br>950 | 460 |
| " " | **Ceres** | | | | | | | | Clydebank | J. Brown T.(G.) | 1917 | 1917 | | | | | | | | | |
| " " | **Coventry** | | | | | | | | Newcastle (Swan Hunter) | Swan Hunter T.(G.) | 1917 | 1918 | | | | | | | | | |
| " " | **Curacoa** | | | | | | | | Pembroke | Harland & Wolff T.(G.) | 1917 | 1918 | | | | | | | | | |
| " " | **Curlew** *See p. 455.* | | | | | | | | Barrow | Vickers P.T.(G.) | 1917 | 1917 | | | | | | | | | |
| " " | **Centaur** | 3750 | 420 | 42 | 0 | 13 | 6 | 40,000 | Elswick | Armstrong T. | 1916 | 1916 | 300,000† | 3 | .. | 5 | *6-in.*, 2 *3-in.*, A.A., 2 *3-pr.*, 2 *2-pr.* Pom Poms; 2 M.; 8 L. | 2 | 29 | Oil<br>840 | 437 |
| " " | **Concord** *See p. 455.* | | | | | | | | Elswick | Armstrong T. | | | | | | | | | | | |
| Cr | **Dartmouth** *See p. 457.* | 5250 | 430 | 48 | 6 | 15 | 6 | 23,467 Y. | Barrow | Vickers P.T. | 1911 | 1911 | 329,406* | 2-¾ | .. | 8 | *6-in.*, 4 *3-pr.*, 4 M., 1 *3-in.* A.A. | 2 | 25·9 *t* | 1290<br>260 | 539 |
| P. L. Cr. | **Despatch** | 4765 | 445 | 46 | 6 | 14 | 3 | 40,000 | Govan | Fairfield T.(G.) | 1919 | 1922 | .. | 3 | Shields | 6 | *6-in.*, 2 *4-in.* A.A., 2 M. | 12 | 29 | Oil<br>1050 | 460 |
| " " | **Diomede** *See p. 454.* | 4750 | | | | | | | Barrow | Vickers T.(G.) | 1919 | 1922 | | | | | | | | | |
| " " | **Danae** | 4750 | 445 | 46 | 0 | 14 | 3 | 40,000 | Elswick | Armstrong T.(G.) | 1918 | 1918 | .. | 3 | Shield | 6 | *6-in.*, 2 *3-in.* A.A., 2 M. | 12 | 29 | Oil<br>1050 | 460 |
| " " | **Dauntless** | | | | | | | | Jarrow | Palmer T.(G.) | 1918 | 1918 | | | | | | | | | |
| " " | **Dragon** *See p. 454.* | | | | | | | | Green'ck | Scott T.(G.) | 1917 | 1918 | | | | | | | | | |

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* Total estimated cost of ship, including guns.

† Estimated cost as originally designed.

‡ The Champion of this class has 4-in. anti-aircraft guns; Comus, Carysfort, and Calliope have 4 3-pr.

§ Champion and Calliope have 2 submerged tubes.

## GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

| Class | NAME. | Displacement. | Length. | Beam (Extreme.) | | Draught. | | Indicated Horse Power. | Where Built. | Maker of Engines. | Date of Launch. | Date of Completion. | Cost. | Armour. Belt. / Deck. | Armour. Gun Position. | Armament. Guns. | Armament. Torpedo Tubes. | Speed. | Fuel. Coal. / Oil. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tons. | ft. | ft. | ins. | ft. | ins. | | | | | | £ | in. | in. | | | knots. | tons. | |
| P. L. Cr. | **Delhi** | 4750 | 445 | 46 | 0 | 14 | 3 | 40,000 | Elswick | Armstrong T. (G.) | 1918 | 1919 | .. | 3 | Shields | 6 *6-in.*, 2 *3-in.* A.A. (Durban 2 *4-in.* A.A.), 2 M. | 12 | 29 | Oil<br>1050 | 460 |
| „ „ | **Dunedin** | 4750 | | | | | | | Elswick | Armstrong T. (G.) | 1918 | 1919 | | | | | | | | |
| „ „ | **Durban** *See p.* 454. | 4765 | | | | | | | Green'ck | Scott T. (G.) | 1919 | 1921 | | | | | | | | |
| Cr. | **Dublin** *See p.* 457. | 5400 | 430 | 49 | 10 | 15 | 9 | 25,000 Y. | Dalmuir | Beardmore P. T. | 1912 | 1913 | 337,565* | 3<br>– | .. | 8 *6-in.*, 1 *3-in.* A.A., 4 *3-pr.*, 2 M., 8 L. | 2 | 25·5 | 1100<br>260 | 495 |
| A.C. | **Eagle,** *ex* Almirante Cochrane. | 22,790 | 625 | 105 | 2 | 21 | 11 | 50,000 | Walker | J. Brown T. | 1918 | .. | 3,310,042 | .. | .. | 9 *6-in.*, 6 *4-in.* A.A., 4 *3-pr.* | .. | 24 | 3750<br>Oil | 834 |
| P. L. Cr. | **Effingham** | 9750 | 565 | 65 | 0 | 17 | 3 | 70,000 (Hawkins 60,000) | Portsmouth | Harland & Wolff. T. | 1921 | .. | 750,000† | 3 | Shields | 7 *7·5-in.*, 3 *4-in.* A.A., 2 *2-pr.*; 2 M.; 8 L. | 6 | 30 | 2150<br>Oil | 743 |
| „ „ | **Frobisher** | | | | | | | | Devonport | Wallsend Eng. Co. T. | 1920 | .. | | | | | | | 800<br>1480 | |
| „ „ | **Hawkins** *See p.* 453. | | | | | | | | Chatham | Parsons Co. T. (G.) | 1917 | 1919 | | | | | | | | |
| P. L. Cr. | **Enterprise** | 7550 | 535 | 54 | 6 | 16 | 6 | 80,000 | Clydebank | John Brown T. (G.) | 1919 | .. | .. | 3–1½<br>1 | .. | 7 *6-in.*, 3 *4-in.* A.A., 4 *3-pr.*, 2 *2-pr.* Pom Poms; 1 M. | 12 | 33 | 1600<br>Oil | 577 |
| „ „ | **Emerald** *See p.* 452. | | | | | | | | Elswick | Armstrong T. (G.) | 1920 | .. | .. | | | | | | | |
| A.C. | **Hermes** | 10,950 | 548 | ‡70 | 3 | 18 | 7 | 40,000 | Elswick | Parsons Co. T. (G.) | 1919 | | .. | .. | .. | 7 *5·5-in.*, 4 *4-in.* A.A. 4 *3-pr.* | .. | 25 | 2000<br>Oil | 568 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cr. | **Lowestoft.**<br>*See p.* 457. | 5440 | 430 | 49 | 10 | 15 | 10 | 25,000 | Chatham | Fairfield<br>T. | 1913 | 1914 | 375,162 | .. | .. | 9 *6-in.*, 4 *3-pr.*, 1 *3-in.* A.A., 2 M., 8 L. | 2 | 25·5 | 1075<br>235 | 580 |
| A. C. | **Pegasus**<br>(late Stockholm) | 3070 | 332 | 43 | 0 | 14 | 6 | 9,500<br>† | Clydeb'nk | J. Brown<br>B.C.T.(G.) | 1917 | 1917 | .. | . | .. | 4 *12-pr.* (2 A.A.), 15 M. | Nil. | 20·25 | 360<br>Oil | 182 |
| Minelayer | **Princess Margaret** | 5440 | 395½ | 54 | 0 | 16 | 6 | 15,000 | Dumbarton. Purchased 1919 | Denny | 1914<br>(Refitted 1921-22) | 1914 | .. | .. | .. | 2 *4-in.*, 2 *3-in.* A.A. | Nil. | 22¼ | 585<br>Oil | 233 |
| Cr. | **Southampton**<br>*See p.* 457 | 5400 | 430 | 49 | 10 | 15 | 9 | 25,000<br>Y. | Clydeb'nk | J. Brown<br>C.T. | 1912 | 1913 | 336,469* | 3 | .. | 8 *6-in.*, 1 *3-in.* A.A., 4 *3-pr.*, 2 M., 8 L. | 2 | 25·5 | 1120<br>235 | 560 |
| L. Cr. | **Vindictive**<br>*ex* Cavendish<br>*See p.* 458. | 9750 | 565 | 65 | 0 | 20 | 4 | 60,000 | Belfast | Harland & Wolff<br>T.(G.) | 1918 | 1918 | .. | .. | .. | 4 *7·5 in.*, 4 *3-in.*, Q.F., 4 *3-in.* A.A., 1 *12-pr.*, 13 M. | 6 | 28·75 | 800<br>1420 | .. |
| L. Cr. | **Weymouth** | 5250 | 430 | 48 | 6 | 15 | 6 | 22,000<br>Y. | Elswick | Parsons<br>P. T. | 1910 | 1911 | 337,738* | 2¾ | .. | 8 *6-in.*, 1 *12-pr.*, 1 *3-in.* A.A., 16 M. | 2 | 25·5<br>‡ | 1290<br>260 | 540 |
| ,, | **Yarmouth**<br>*See p.* 457. | | | | | | | | Glasgow | London & Glas. Co.<br>C. T. | 1911 | 1912 | 353,238* | | | | | | | |

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* Total estimated cost of ship, including guns.  † Estimated cost as originally designed.  ‡ Extreme breadth under water; 100 ft. over seaplane lifting rails.

There are a number of other vessels on the non-effective list which are being used for various purposes as repair ships, and other auxiliary work, including depôt ships for destroyers and submarines.

# Defence Forces of the Dominions.

## ROYAL AUSTRALIAN NAVY.

| Class. | NAME. | Displacement. | Length. | Beam. (Extreme.) | Draught. | Indicated Horse-Power. | Where Built. | Maker of Engines. | Date of Launch. | Date of Completion. | Cost. | Armour. Belt. / Deck. | Armour. Gun Position. | Armament. Guns. | Armament. Torpedo Tubes. | Speed. | Coal. / Oil | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tons. | ft. | ft. in. | ft. in. | | | | | | £ | in. | in. | | | knots | tons. | |
| L. Cr. | **Adelaide** | 5550 | 430 | 49 10 | 15 10 | 25,000 | Sydney | T. | 1918 | 1922 | .. | .. | .. | 9 *6-in.*, 4 *3-pr.*, 2 M. 1 *3-in.* A.A., 8 L. | 2 | 25 | 860 / 500 | 450 |
| ,, | **Melbourne** | 5400 | 430 | 49 10 | 15 9 | 25,000 | Birkenhead | Cammell Laird. T. | 1912 | 1913 | .. | 3 | .. | 8 *6-in.*, 4 *3-pr.*, 2 M., 1 *3-in.* A.A., 8 L. | 2 | 25·5 | 1148 / 271 | 390 |
| ,, | **Sydney** | | | | | | Glasgow | London & Glasgow Co. T. | 1912 | 1913 | | | | | | | 1210 / 260 | 392 |
| ,, | **Brisbane** | | | | | | Sydney | Vickers T. | 1915 | 1916 | | | | | | | 1196 / 260 | 391 |
| Flot. Ldr. | **Anzac** | 1670 | 315 | 31 10 | 11 1 | 36,000 | Dumbarton | Denny T. | 1917 | 1917 | .. | .. | .. | 4 *4-in.* Q.F., 2 *2-pr.* A.A 1 M., 4 L. | 2 | 34 | 515 Oil | 122 |

DESTROYERS.—"*River*" *Class*:—Huon, Parramatta, Swan, Torrens, Warrego, Yarra. Launched, 1910–15; Displacement, 700 tons; 10,900–11,300 H.P.; speed, 26·5–27 knots; armament, one 4-in, three 12-pdrs., three tubes.

"*S*" *Class*:—Stalwart, Success, Swordsman, Tasmania, Tattoo. Launched, 1918–19; Displacement, 1,075 tons; 27,000 H.P.; speed, 36 knots; armament, three 4-in., one 2-pdr., 6 tubes (4 21-in., 2 18-in.).

SUBMARINES.—"*J*" *Class*:—J 7. Launched, 1916–18; Displacement, surface, 1,210 tons, submerged, 1,820 tons; H.P., surface, 3,600, submerged, 1,350; speed, surface, 19 knots, submerged, 9½ knots; oil fuel, 91 tons; armament, one 4-in., six 18-in. tubes.

SLOOPS.—"*Flower*" *Class*:—Mallow, Marguerite, Geranium. Launched, 1915; Displacement, 1,250 tons; 2,000 H.P.; speed, 16·5 knots; armament, one 4·7-in.. two 3-pr. A.A.

The Royal Australian Navy also includes the Cerberus, gunboat; Platypus, submarine depôt ship; and certain armed patrol vessels taken up for the war service.

## NEW ZEALAND NAVY.

Light Cruiser—"*City*" *Class*:—Chatham. Completed, 1912 (Chatham Dockyard and Thames Ironworks). Displacement, 5,400 tons; 25,000 H.P.; speed, 25½ knots; armament, eight 6-in., four 3-pr., one 3-in. A.A., two M., two 21-in. tubes; max. coal, 1,060 tons; oil, 260 tons; complement, 429.

Ex-Light Cruiser.—"*Pearl*" *Class*:—Philomel. (Training and Depôt-ship, Auckland.) Completed, 1892 (Devonport and Earle). Displacement, 2,575 tons; 7,500 H.P.: speed, 19 knots: armament, one 6-in., one 4-in., two 12-pr.; coal, 300 tons; original complement, 217.

## NEWFOUNDLAND.

Sloop.—"*Flower*" *Class*:—Lobelia. Completed 1916 (Simons). Displacement, 1,250 tons; 2,000 H.P.; speed, 16·5 knots; armament, two 4-in.

## ROYAL CANADIAN NAVY.

Light Cruiser.—"*Arethusa*" *Class*:—Aurora. Completed, 1914 (Devonport Dockyard and Parsons Co.). Displacement, 3,500 tons; 40,000 H.P.; speed, 29 knots; armament, two 6-in., six 4-in. Q.F., one 4-in. A.A., two M., four 21-in. tubes; oil, 729 tons; complement, 318.

Destroyers.—"*M*" *Class*:—Patrician and Patriot. Completed, 1916 (Thornycroft). Displacement, 1000 tons; 27,500 H.P.; speed, 35 knots; armament, three 4-in., one 2-pr., four 21-in. tubes; oil, 256 tons (radius of action, 1,510 at 15 knots).

Submarines.—"*H*" *Class*:—CH 14, CH 15. Surface displacement, 364 tons, submerged, 434; surface H.P., 480, submerged, 320; surface speed, 13 knots, submerged, 11 knots; oil fuel, 14 tons; armament, four 21-in. tubes.

Minesweepers.—Festubert and Ypres, stationed at Halifax; and Armentieres and Thiepval, stationed at Esquimalt.

The Royal Canadian Navy has no effective ships of the larger classes, the cruisers Niobe and Rainbow, which were lent for training purposes, being ordered in March, 1920, to be paid off for sale. The Stadacona is in service as depôt-ship at Halifax and the motor-vessel Naden as depôt-ship at Esquimalt.

## SOUTH AFRICA.

Surveying Ship.—"*Beaufort*" *Class*:—Protea (ex-Crozier). Twin-screw mine-sweeper, converted 1919. Displacement, 800 tons; 2,200 H.P.; speed, 16 knots; coal capacity, 181–185 tons; armament, one 3-pr. Transferred to South Africa, September, 1921.

Trawlers.—*Admiralty Type*:—Immortelle and Sonneblom (late Eden and Foyle). Armament, one 12-pr. Transferred to South Africa, September, 1921, for mine-sweeping instructional duties.

The gunboat Afrikander (late Tickler) is employed as depôt-ship at Simonstown.

# ARGENTINE REPUBLIC.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Fuel. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. | | Guns. | Torpedo Tubes. | | Coal.<br>Oil. | |
| | | | | | | | | | | | | | | | Heavy Guns. | Second-ary. | | | | | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *a.c.* | **Garibaldi** . . | 6840 | 328 | 59¾ | 24 | 13,384 | Sestri Ponente | 1895 | 1896 | 752,000 | 6–3<br>H.S. | 1½ | 6<br>H.S. | 6<br>H.S. | 6<br>H.S. | 6<br>H.S. | 2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 M. | 2 | 19·9<br>*t* | 1000 | 500 |
| *a.c.* | **General Belgrano** . | 7069 | 328 | 59¾ | 24 | 13,000 | Leghorn . | 1897 | 1899 | 696,700 | 6–3<br>H.S. | 1½ | 6<br>H.S. | 6<br>H.S. | 6<br>H.S. | 6<br>H.S. | 2 *10-in.*, 14 *6-in.*, 2 *3-in.*, 4 *2·2-in.*, 2 L., 2 M. | .. | 20·1<br>*t* | 1000 | 500 |
| *a.c.* | **General San Martin** | 6773 | 328 | 59¾ | 24 | 13,000 | Leghorn . | 1896 | 1898 | 688,200 | 6–3<br>H.S. | 1½ | 6<br>H.S. | 6<br>H.S. | 6<br>H.S. | 6<br>H.S. | 4 *8-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 L., 2 M. | 4 | 19·8 | 1100 | 500 |
| *b.* | **Moreno** . .<br>**Rivadavia** .<br>*See p.* 459. | 27940 | 585 | 95½ | 28 | 39.500<br>B. & W.<br>Curtis t. | Camden, N.J. (N.Y.S.B.Co.)<br>Quincy, Mass. | 1911 | 1914<br>1915 | 2,200,000 | 12–10<br>K.S. | 3–2 | 9–6<br>K.S. | 9<br>K.S. | 12–9<br>K.S. | 6<br>K.S. | 12 *12-in.*, 12 *6-in.*, 16 *4-in.*, 8 smaller. | 2<br>sub. | 22<br>*t* | 1600<br>4000 | 1046 |
| *a.c.* | **Pueyrredon** . . | 6840 | 328 | 59¾ | 24 | 13,000<br>B. | Sestri Ponente | 1898 | 1901 | 782,000 | 6–3<br>H.S. | 1½ | 6<br>H.S. | 5<br>H.S. | 6<br>H.S. | 6<br>H.S. | 2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 4 *2·2-in.*, 2 M. | .. | 20·1<br>*t* | 1000 | 430 |

The old coast-defence ironclads Libertad and Independencia, 2300 tons, completed at Birkenhead in 1892–93, carry two 9·4-in., four 4·7-in., and four 3-pr. guns.

Cruiser Buenos Aires (Elswick, 1895), 4780 tons, two 8-in., four 6-in., six 4·7 in., three T.T., 23·2 knots on trial; river gunboats Patria (1894), 1070 tons, two 4·7 in., eight smaller, five T.T., Paraná and Rosario (Elswick, 1909), 1000 tons, two 6-in. howitzers, six 12-pr., twelve smaller, 15 knots. For destroyers, see Flotilla Tables.

The training-ship (cruiser) Presidente Sarmiento, 2750 tons; also the old cruiser Nueve de Julio, 3570 tons, Elswick 1902, and several small gunboats and torpedo-gunboats. There are 14 transports and many auxiliaries and 18 additional have recently been acquired in Europe.

The programme for a considerable reorganisation and the augmentation of the resources of the Navy is still in abeyance.

# BRAZIL.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Coal | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkheads. | Gun Position. | | Guns. | Torpedo Tubes. | | | |
| | | | | | | | | | | | | | | | Heavy Guns. | Second-ary. | | | | | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons | |
| c.d.s., t. | **Marshal Deodoro** | 3162 | 267½ | 48 | 13¼ | 3400 D'A. | La Seyne | 1898 | 1900 | .. | 13¾–4 H.S. | 1½ | .. | .. | 8 H.S. | 3 H.S. | 2 *9·4-in.*, 4 *4·7-in.*, 2 M., 4 *6-pr.*. 2 *1-pr.* | 2 (sub.) | 15·0 | 236 | 200 |
| c.d.s., t. | **Marshal Floriano** | | | | | | | 1899 | 1901 | | | | | | | | | | | | |
| b. | **Minas Geraes**<br>*See p.* 460. | 19,281 | 500 | 83 | 25 | 27,212<br>*t*<br>B.&W. | Elswick | 1908 | 1909 | 1,821,400 | 9–6–4 K.S. | 2 | 9–6–4 K.S. | 9 | 12–8 K.S. | 9 K.S. | 12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.* | 4 | 21·5<br>*t* | 900<br>2400 | 900 |
| b. | **São Paulo**<br>*See p.* 460. | 19,281 | 500 | 83 | 25 | 28,645<br>*t*<br>B.&W. | Barrow | 1909 | 1910 | 1,821,400 | 9–6–4 K.S. | 2 | 9–6–4 K.S. | 9 K.S. | 12–8 K.S | 9 K.S. | 12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.* | 4 | 21·5<br>*t* | 900<br>2400 | 900 |

The Minas Geraes and São Paulo have been completely refitted at the Brooklyn Navy Yard.

LIGHT CRUISERS:—Bahia and Rio Grande do Sul, completed at Elswick, 1910, 3100 tons, ten 4·7-in., six 1·8-in. guns, 17,000 H.P., 27 knots; Barroso (Elswick, 1897), 3600 tons, six 6-in., four 4·7-in. guns, 20 knots; also the old crusier Republica, now a mine-layer. Four 12-knot river gunboats, Missões, Acre and two others (Poplar, 1907). Carlos Gomes, mine-layer (550 mines). Torpedo-gunboat Tymbira, fitted as mine-layer. Also river monitors Maranhao and Pernambuco, built at Rio de Janeiro.

# CHILE.—Armoured Ships.

| Class. | NAME | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Fuel. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. Heavy Guns. | Gun Position. Second-ary. | Guns. | Torpedo Tubes. | | Coal. / Oil. | |
| | | tons. | ft. | ft. ins. | ft. ins. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| b | **Almirante Latorre** (*ex* Canada) *See p.* 461. | 28,000 | 625 | 92 0 | 28 6 | 37,000<br>P. tur.<br>Y 2 | Elswick | 1913 | 1915 | .. | 9–4<br>A.I. | 4–2½ | 4½ | .. | 10 | 6 | 10 *14-in.*, 14 *6-in.*, 2 *3-in.* and smaller | 4<br>sub. | 23 | 3300<br>520 | 1000 |
| s.c. | **O'Higgins** | 8,500 | 412 | 62 9 | 22 0 | 16,000<br>B. | Elswick | 1897 | 1898 | .. | 7–5 | 2 | .. | .. | 7½–6 | 6 | 4 *8-in.*, 10 *6-in.*, 10 *12-pr.*, 10 *6-pr.*, 4 M. | 8<br>(2 sub.) | 21·5<br>*t* | 1260 | 500 |
| b. | **Capitan Prat** | 6,900 | 328 | 60 9 | 22 9 | 12,000 | La Seyne | 1890 | 1893 | 391,000 | 12 | 3 | 4 | .. | 10½ | 2 | 4 *9·4-in.* (Canet), 8 *4·7-in.* (Canet), 10 *6-pr.*, 14 smaller and M. | 4 | 18·3<br>*t* | 775 | 500 |
| a.c. | **Esmeralda** | 7,020 | 436 | 53 3 | 20 3 | 16,000 | Elswick | 1896 | 1897 | .. | 6<br>H.S. | 2 | .. | 6<br>H.S. | 4½<br>Shields | .. | 2 *8-in.*, 12 *6-in.*, 12 *12-pr.*, 2 *3-pr.*, 4 M. | 2 | 22·8<br>*t* | 1350 | 500 |

Capitan Prat reconstructed in 1909.

# Cruising Ships, &c.

| Class | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | Armament. | | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Deck. | Gun Position. | Guns. | Torpedo Tubes. | | | |
| | | tons. | ft. | ft. ins. | ft. ins. | | | | | | in. | in. | | | knots. | tons. | |
| cr. | **Blanco Encalada** | 4400 | 370 | 46 6 | 19 6 | 14,500 | Elswick | 1893 | 1894 | .. | 4–1¾ | .. | 2 *8-in.*, 10 *6-in.*, 12 *3-pr.*, 10 *1-pr.** | 5 | 22·78<br>*t* | 850 | 427 |
| ,, | **Chacabuco** | 4500 | 360 | 46 6 | 17 0 | 15,500 | Elswick | 1901 | 1903 | .. | 4½–1¾ | .. | 2 *8-in.*, 10 *4·7-in.*, 12 *1·8-in.*, 2 M., 1 l. | 5 | 23·0 | 1000 | 400 |
| ,, | **General Baquedano** (Training) | 2330 | 240 | 45 9 | 18 0 | 1500<br>B. | Elswick | 1898 | 1900 | .. | .. | .. | 4 *4·7-in.*, 2 *12-pr.*, 2 *6-pr.*, 2 M., 1 l. | 1 | 13·7<br>*t.* | 300 | 302 |
| ,, | **Ministro Zenteno** | 3600 | 330½ | 43 9 | 16 9 | 6500 | Elswick | 1896 | 1898 | .. | .. | .. | 8 *6-in.*, 10 *6-pr.*, 4 *1-pr.** | 3 | 20·0*t* | 800 | 280 |
| ,, | **Presidente Errázuriz** (Training) | 2047 | 268 | 35 9 | 19 6 | 5400 | La Seyne | 1890 | 1892 | .. | 3½ | .. | 4 *6-in.* (Canet), 2 *5-in.*, 4 *2·2-in.*, 6 M. | 3 | 19·0 | 200 | 171 |

* Armstrong.

Transports: Maipo, 11,000 tons; Rancagua, 10,000 tons; Angamos, 5,000 tons. Sloops or patrol vessels: Orompello, Leucoton, Elicura, Colocolo, 500 tons; Yanez, Yelcho, Huemul, Condor, 100 to 250 tons.

## DENMARK.—Armoured Ships.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. Belt. | Armour. Deck. | Armour. Side above Belt. | Armour. Bulkhead. | Armour. Gun Position. Heavy Guns. | Armour. Gun Position. Second-ary. | Armament. Guns. | Armament. Torpedo Tubes. | Speed. | Fuel. Coal. / Oil. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tons. | ft. ins. | ft. ins | ft. ins | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *c.d.s.,t.* | **Herluf Trolle** . | 3595 | 271 9 | 49 6 | 16 6 | 4400 T. | Copenhagen | 1899 | 1901 | .. | 7–4<br>H.S. | 3 | .. | .. | 7<br>H.S. | 6<br>H.S. | 2 *9·4-in.*, 4 *5·9-in.*, 6 *14-pr.*, 2 *6-pr.* | 3 (sub.) | 16·0 | 250 | 250 |
| *c.d.s.,t.* | **Niels Juel** . | 4100 | 295 0 | 53 6 | 15 9 | 5500 | Copenhagen | 1918 | 1923 | .. | 8–4<br>K.S. | 2 | .. | 7 | .. | 2<br>K.S. | 10 *5·9-in.*, 3 *6-pr.* | 2 (sub.) | 17·0 | 250<br>240 | 250 |
| *c.d.s.,t.* | **Olfert Fischer** . | 3650 | 271 9 | 50 6 | 16 9 | 4600 | Copenhagen | 1903 | 1905 | .. | 7–4<br>K.S. | 3 | .. | .. | 7<br>K.S. | 6 | 2 *9·4-in.*, 4 *5·9-in.*, 6 *14-pr.*, 2 *6-pr.* | 3 (sub.) | 16·0 | 250 | 250 |
| *c.d.s.,t.* | **Peder Skram** . | 3735 | 275 3 | 51 6 | 16 3 | 5400 | Copenhagen | 1908 | 1909 | .. | 8–4<br>K.S. | 2 | .. | .. | 7<br>K.S. | 6<br>K.S. | 2 *9·4-in.*, 4 *5·9-in.*, 10 *14-pr.*, 2 *1-pr.* | 4 | 16·0 | 250 | 250 |
| *c.d.s.,t.* | **Skjold** . . | 2200 | 226 6 | 38 0 | 13 6 | 2400 T. | Copenhagen | 1896 | 1899 | .. | 10–3<br>H.S. | 2 | .. | 7 | 8 | 5½ | 1 *9·4-in.*, 3 *4·7-in.* (K.), 4 *6-pr.* | 4 | 13·0 | 280 | 210 |

## Cruising Ships, &c.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. Deck. | Armour. Gun Position. | Armament. Guns. | Armament. Torpedo Tubes. | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | | | | tons. | |
| 3rd cl. *cr.* | **Geiser** . . . | 1280 | 232 | 34 | 11¼ | 3600 T. | Copenhagen . | 1892 | 1893<br>1907 | .. | 1½ | .. | 2 *4·7-in.*, 4 *20-pr.*, 4 *6-pr.* | 2 | 17·1<br>*t* | 150 | 155 |
| ” | **Heimdal** . . | 1313 | 232 | 34 | 11¾ | 3100 T. | Copenhagen . | 1894 | 1896 | .. | 1½ | .. | 2 *4·7-in.*, 4 *20-pr.*, 4 *6-pr.*, 6 M. | 2 | 17·5 | 150 | 155 |

Heimdal, used as cadets' training ship. Valkyrien (3020 tons), reconstructed 1913, training ship. Mine-layers Lossen, Hjælperen, Beskytteren, Minekran 1-6, Mining boats 1-10. Torpedo transport Slejpner. Fylla (ex-British sloop Asphodel), and 4 other fishery inspection cruisers. Groensund, submarine repair ship, Hekla, marine depôt. Three surveying ships.

# FRANCE.—Armoured Ships.

| Class | NAME. DATE FOR SCRAPPING.‡ | Displacement. | Length. | | Beam. | | Draught. | | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Fuel. Coal. Oil. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. Heavy Guns. | Gun Position. Second-ary. | Guns. | Torpedo Tubes. | | | |
| | | tons. | ft. | ins. | ft. | ins. | ft. | ins. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *b.* | **Bretagne** .<br>1934 *See p.* 462. | . 23,177 | 544 | 6 | 88 | 6 | 29 | 0 | 29,000<br>N. tur. | Brest . | 1913 | 1915 | 2,589,439 | 11–7<br>K.S. | 2¾–1¾ | 7<br>K.S. | 7<br>K.S. | 10½<br>K.S. | 7<br>K.S. | 10 *13·4-in.*, 18 *5·5-in.*, 2 *14-pr.* A.A. | 4<br>(sub.) | 20·0 | 2700<br>300 | 1167 |
| *b.* | **Condorcet.**<br>*See p.* 464. | . 18,600 | 475 | 9 | 84 | 7 | 27 | 0 | 22,500<br>N. tur. | St. Nazaire | 1909 | 1911 | 2,165,200 | 10–8<br>K.S. | 2¾ | 8¾ | .. | 12<br>K.S. | 8¾<br>K.S. | 4 *12-in.*, 12 *9·4-in.*, 12 *3-in.*, 2 *3-pr.* | 2<br>(sub.) | 19·25<br>*t* | 2100<br>Coal. | 690 |
| *b.* | **Courbet** .<br>1930 *See p.* 463. | . 23,500 | 541 | 4 | 88 | 6 | 29 | 0 | 28,000<br>N. tur. | Lorient . | 1911 | 1913 | 2,508,388 | 11–7<br>K.S. | 2¾–1¾ | 7<br>K.S. | 7<br>K.S. | 10½<br>K.S. | 7<br>K.S. | 12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.* | 4<br>(sub.) | 20·0 | 2450<br>250 | 998 |
| *b.* | **Diderot** .<br>*See p.* 464. | . 18,600 | 475 | 9 | 84 | 7 | 27 | 0 | 22,500<br>N. tur. | St. Nazaire | 1909 | 1911 | 2,167,000 | 10–8<br>K.S. | 2¾ | 8¾ | .. | 12<br>K.S. | 8¾ | 4 *12-in.*, 12 *9·4-in.*, 12 *3-in.*, 2 *3-pr.* | 2<br>(sub.) | 19·25<br>*t* | 2100<br>Coal. | 690 |
| *a.c.* | **Edgar Quinet** .<br>*See p.* 466. | 13,990 | 515 | 0 | 70 | 7 | 27 | 6 | 39,803<br>*t* B. | Brest . | 1907 | 1911 | 1,307,536 | 6½–3½<br>K.S. | 2½–1¼ | 5–2<br>K.S | 4¾<br>K.S. | 8<br>K.S. | 4¾<br>K.S. | 14 *7·6-in.*, 14 *9-pr.*, and smaller | 2<br>(sub.) | 23·0<br>*t* | 1900<br>Coal. | 738 |
| *a.c.* | **Ernest Renan** .<br>*See p.* 465. | 13,500 | 515 | 0 | 70 | 0 | 27 | 6 | 37,500<br>Nic., *t* | St. Nazaire | 1906 | 1909 | 1,410,000 | 6¾–4<br>H.S. | 2 | 5–3<br>H.S. | 4¾ | 6<br>H.S. | 5<br>H.S. | 4 *7·6-in.*, 12 *6·5-in.*, and smaller | 2<br>(sub.) | 23·0<br>*t* | 2300<br>Coal. | 674 |
| *b.* | **Jean Bart** .<br>1930 *See p.* 463. | . 23,500 | 541 | 4 | 88 | 6 | 29 | 0 | 28,000<br>B. tur. | Brest . | 1911 | 1913 | 2,528,888 | 11–7<br>K.S. | 2¾–1¾ | 7<br>K.S. | 7<br>K.S. | 10½<br>K.S. | 7<br>K.S. | 12 *12-in.*, 22 *5·5-in*, 4 *3-pr.* | 4<br>(sub.) | 20·0 | 2450<br>250 | 998 |
| *a.c.* | **Jules Ferry** .<br>*See p.* 465. | 12,351 | 487 | 0 | 70 | 3 | 27 | 0 | 30,500<br>Guyot | Cherbourg | 1903 | 1906 | 1,169,940 | 6¾–4<br>H.S. | 2 | 5–3<br>H.S. | 6 | 6<br>H.S. | 5<br>H.S. | 4 *7·6-in.*, 14 *6·4-in.*, 24 smaller | 2<br>(sub.) | 22·0<br>*t* | 1900<br>Coal. | 728 |
| *a.c.* | **Jules Michelet**.<br>*See p.* 465. | 13,100 | 489 | 0 | 70 | 3 | 27 | 0 | 27,700<br>Guyot | Lorient . | 1905 | 1908 | 1,204,107 | 6–4<br>K.S. | 2 | 5–3<br>K.S. | 6<br>H.S. | 8<br>K.S. | 5<br>K.S. | 4 *7·6-in.*, 12 *6·5-in.*, and smaller | 2<br>(sub.) | 22·0<br>*t* | 2100<br>Coal. | 724 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *b.* | **Lorraine** .<br>1936 *See p.* 462. | . 23,177 | 544 6 | 88 6 | 29 0 | 29,000<br>tur.<br>S. & cyl. | St. Nazaire | 1913 | 1916 | 2,642,439 | 11–7<br>K.S. | 2¾–1¾ | 7<br>K.S. | 7<br>K.S. | 10½<br>K.S. | 7<br>K.S. | 10 *13·4-in.*, 18 *5·5-in.*, 4 *14-pr.* A.A. | 4<br>(sub.) | 20·0 | 2700<br>300 | 1167 |
| *b.* | **Paris** . .<br>1934 *See p.* 463. | . 23,500 | 541 4 | 88 6 | 29 0 | 28,000<br>N. tur. | La Seyne . | 1912 | 1914 | 2,603,920 | 11–7<br>K.S. | 2¾–1¾ | 7<br>K.S. | 7<br>K.S. | 10½<br>K.S. | 7<br>K.S. | 12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.* | 4<br>(sub.) | 20·0 | 2450<br>250 | 998 |
| *b.* | **Provence** .<br>1935 *See p.* 462. | . 23,177 | 544 6 | 88 6 | 29 0 | 29,000<br>tur. | Lorient . | 1913 | 1915 | 2,589,000 | 11–7<br>K.S. | 2¾–1¾ | 7<br>K.S. | 7<br>K.S. | 10½<br>K.S. | 7<br>K.S. | 10 *13·4-in.*, 18 *5·5-in.*, 4 *14-pr.* A.A. | 4<br>(sub.) | 20·0 | 2700<br>300 | 1167 |
| *a.c.* | **Victor Hugo**<br>*See p.* 465. | . 13,108 | 480 6 | 70 3 | 27 0 | 28,486<br>*t.* B. | Lorient . | 1904 | 1907 | 1,229,932 | 6¾–4<br>H.S. | 2 | 5-3<br>H.S. | 6 | 8<br>H.S. | 5<br>H.S. | 4 *7·6-in.*, 16 *6·4-in.*, 24 smaller | 2<br>(sub.) | 22·0<br>*t* | 1900<br>Coal | 728 |
| *b.* | **Voltaire** .<br>*See p.* 464. | . 18,600 | 475 9 | 84 7 | 27 0 | 22,500<br>B. tur. | La Seyne . | 1909 | 1911 | 2,169,200 | 10–8<br>K.S. | 2¾ | 8¾ | . . | 12<br>K.S. | 8¾<br>K.S. | 4 *12-in.* 12 *9·4-in.*, 12 *3-in.*, 2 *3-pr.* | 2<br>(sub.) | 19·25<br>*t* | 2100<br>Coal. | 690 |
| *a.c.* | **Waldeck-Rousseau**<br>*See p.* 466. | . 13,990 | 515 0 | 70 7 | 27 6 | 35,286<br>Nic. *t.* | Lorient . | 1908 | 1911 | 1,301,380 | 6½–3½ | 2½ | 5 | 4¾ | 6 | 5½ | 14 *7·6-in.*, 14 *9-pr.*, and smaller | 2<br>(sub.) | 23·0<br>*t* | 1900<br>Coal. | 738 |

The battleship France, lost by striking a rock at Quiberon Bay, August 25, 1922, belonged to the Fleet authorised by the Treaty of Washington, but no provision has been made to replace her. In the case of the battleships Condorcet, Diderot, and Voltaire, the date of scrapping has not been indicated.

The uncompleted battleship Béarn is being converted into an aircraft carrier at Toulon.

The armoured cruisers Condé, Gueydon, Marseillaise, Montcalm, and Jeanne d'Arc (1902–4) are retained temporarily as Training Ships.

## FRANCE.—Cruising Ships, &c.

| Class. | NAME. | Displacement. | Length | Beam. |  | Draught. |  | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. |  | Armament. |  | Speed. | Fuel. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |  |  | Belt. | Gun Position. | Guns. | Torpedo Tubes. |  |  |  |
|  |  | tons. | ft. | ft. | ins. | ft. | ins. |  |  |  |  | £ | in. | in. |  |  | knots. | tons. |  |
| l. cr. | **Tourville**<br>**Duquesne**<br>And 4 others | 10,000 | 607 | 62 | 4 | 19 | 6 | 120,000 | Lorient<br>Brest<br>Projected | Bldg. | .. | .. | .. | .. | 8 *8-in.*, 8 *3-in.* A.A. (reported) | 2<br>triple | 34–35 | oil |  |
| ,, | **Colmar** (*ex*-Kolberg). *See p.* 470. | 4280 | 426½† | 46 | 0 | 16 | 6 | 30,000 *t*<br>(tur.) | Danzig<br>(Schichau) | 1908 | 1910 | 380,870 | 2<br>Deck. | 2 | 6 *5·9-in.*, 2 *3·4-in.* (Rearmed 1916) | 2 | 26·3<br>*t* | 890<br>coal | 379 |
| ,, | **Duguay-Trouin** *See p.* 467. | 8000 | 575 | 56 | 0 | 17 | 0 | 100,000 | Brest | 1923 | .. | .. | .. | .. | 8 *6-in.*, 6 l. & M.; 2 seaplanes; 4 *2·9-in.* A.A. | 4<br>triple | 34 | oil | .. |
| ,, | **La Motte Picquet** *See p.* 467. | 8000 | 575 | 56 | 0 | 17 | 0 | 100,000 | Lorient | Bldg. | .. | .. | .. | .. | 8 *6 in.*, 6 l. & M.; 2 seaplanes; 4 *2·9-in.* A.A. | 4<br>triple | 34 | oil | .. |
| ,, | **Metz** (*ex*-Königsberg) *See p.* 468. | 5300 | 489† | 47 | 0 | 16 | 6 | 40,000 | Bremen(Weser) | 1915 | 1916 | .. | 2½ | 1 | 8 *5·9-in.*, 2 *3·4-in.* A.A., 4 M. | 2 sub.<br>2 aw. | 27·5 | 1270<br>500 | 500 |
| ,, | **Mulhouse** (*ex*-Stralsund) *See p.* 469. | 4480 | 446¼† | 43 | 7 | 16 | 9 | 35,515 *t*<br>(tur.) | Bremen(Weser) | 1912 | 1913 | 416,340 | 4–2½ | 2 | 7 *5·9-in.*, 2 *3·4-in.* A.A., 2 M. (Rearmed) | 2<br>(sub.) | 28·27<br>*t* | 1200<br>130 | 373 |
| ,, | **Primauguet** *See p.* 467. | 8000 | 575 | 56 | 0 | 17 | 0 | 100,000 | Brest | Bldg. | .. | .. | .. | .. | 8 *6-in.*, 6 l. & M.; 2 seaplanes; 4 *2·9 in.* A.A. | 4<br>triple | 34 | oil | .. |
| ,, | **Strasbourg** (*ex*-Regensburg) *See p.* 468. | 4900 | 456† | 45 | 0 | 17 | 0 | 30,000<br>(P. tur.) | Bremen(Weser) | 1914 | 1914 | 417,810 | 4–2½ | 2 | 6 *5·9-in.*, 4 *2·9 in.* A.A., 2 M. (Rearmed) | 4<br>(sub.) | 27·0 | 1200<br>380 | 373 |
| ,, | **Thionville** (*ex*-Novara) *See p.* 469. | 3500 | 410¾ | 42 | 0 | 15 | 6 | 25,000<br>(tur.) | Fiume | 1913 | 1914 | .. | 2½ | .. | 9 *3·9-in.*, 1 *14-pr.* A.A. | 2<br>twin<br>1<br>triple | 27·0 | 800<br>coal | 320 |

† Water-line.

During the war, and subsequently, the following sloops, despatch vessels, and gunboats (350-1250 tons, 17-22 knots) have been built: **Algol, Altaïr, Aldebaran, Antarès, Bellatrix, Cassiopée, Régulus,** Quentin-Roosevelt, Dubordieu, Dumont d'Urville, Du Couëdic, Du Chaffault, Duperré, Ancre, Ailette, **Arras, Bapaume, Escaut, Marne, Oise, Somme, Coucy, Nancy, Amiens,** Aisne, Epernay, Lunéville, Péronne, Mondemart, Montmirail, Reims, Verdun, Belfort, Epinal, Vauquois, **Vimy, Vitry-le-François, Les Eparges, Lassigny, Remiremont, Revigny,** Calais, Craonne, Liévin, Baccarat, Béthune, Scarpe, Suippe, Yser, Tahure, Dunkerque, Toul, Ville d'Ys, **Meuse, and Chamois.** In this series the vessels bearing the names of stars are sloops, and carry two 5·5-in. and two 6-prs.; the gunboats named after old seamen, one 5·5-in. and one 3·9-in.; those named in honour of towns famed in the war, two 5·5-in., one 12-pr. and 2 M.; and those bearing the names of rivers known in the war, four 3·9-in. and five smaller. In addition are several older gun-vessels and 3 river gunboats built and two building. The despatch vessel Reims is completing.

Twenty-four mine-trawlers of the Belliqueuse type, and a large flotilla of mine-trawlers. Submarine chasers fifty-four (internal-combustion engines), fifteen (coal). Foudre, 5984 tons, repair ship.

Merchant Auxiliary Cruisers.—**La France, 22,500 register tons, 23·5 knots, Touraine, 8429 register tons, 19·5 knots, Lorraine, 11,869 register tons, 21 knots, Savoie, 11,200 register tons, 22½ knots, of the Compagnie Générale Transatlantique, and some other vessels; also the Amazone, Magellan, Tonkin, and other 17 and 17½ knot boats of the Messageries Maritimes, and the Burdigala, 18 knots, and Lutetia, 20·5 knots, of the Sud Atlantique line.**

# GERMANY.

In the following list the letter **R** implies that the ships so marked are to be retained in reserve with their armament, but to have no ammunition on board.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | | | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. Heavy Guns. | Gun Position. Second-ary. | Guns. The *12-prs.* are field guns. | Torpedo Tubes. | Speed. | Coal. | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *b.* | **Braunschweig** | 12,997 | 398½ | 73½ | 24½ | 16,000<br>T.S. & C. | Germania | 1902 | 1904 | 1,157,500 | 9–4<br>K.S. | 3 | 6<br>K.S. | 6<br>K.S. | 10–6<br>K.S. | 6<br>K.S. | 4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M., 1 *12-pr.* | 5<br>(sub.) | 18·0 | 700<br>1600 | 743 |
| *b.* | **Elsass** | 12,997 | 398½ | 72¾ | 24½ | 16,812<br>W.T.& C. | Danzig (Schichau) | 1903 | 1905 | 1,157,500 | 9–4<br>K.S. | 3 | 6<br>K.S. | 6<br>K.S. | 10–6<br>K.S. | 6<br>K.S. | 4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M., 1 *12-pr.* | 5<br>(sub.) | 18·7 | 800<br>1600 | 743 |
| *b.* | **Hannover** | 13,040 | 398½ | 73¾ | 25¼ | 22,492<br>T.S. *t.* | Wilhelmshaven | 1905 | 1907 | 1,157,500 | 9½–4<br>K.S. | 3 | 8<br>K.S. | 6<br>K.S. | 10–6<br>K.S. | 6¾<br>K.S. | 4 *11-in.*, 14 *5·9-in.*, 20 *3·4-in.*, 2 *12-pr.*, 4 M. | 5<br>(sub.) | 19·16<br>*t* | 700<br>1800 | 743 |
| *b.* | **Hessen** | 12,997 | 398½ | 73¾ | 24½ | 16,000<br>T.S. & C. | Kiel (Germania) | 1903 | 1905 | 1,157,500 | 9–4<br>K.S. | 3 | 6<br>K.S. | 6<br>K.S. | 10–6<br>K.S. | 6<br>K.S. | 4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M., 2 *12-pr.* | 5<br>(sub.) | 18·0 | 800<br>1600 | 743 |
| *b.* | R **Lothringen** | 12,997 | 398½ | 73¾ | 24½ | 16,950<br>W.T.&C. | Schichau (Danzig) | 1904 | 1906 | 1,157,500 | 9–4<br>K.S. | 3 | 6<br>K.S. | 6<br>K.S. | 10–6<br>K.S. | 6<br>K.S. | 4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M. | 5<br>(sub.) | 18·54<br>*t* | 800<br>1600 | 743 |
| *b.* | R **Preussen** | 12,997 | 398½ | 73¾ | 24½ | 18,374<br>W.T.& C. | Stettin | 1903 | 1905 | 1,157,500 | 9–4<br>K.S. | 3 | 6<br>K.S. | 6<br>K.S. | 10–6<br>K.S. | 6<br>K.S. | 4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M. | 5<br>(sub.) | 18·6<br>*t* | 1574<br>1600 | 743 |
| *b.*<br>*b.* | **Schlesien**<br>**Schleswig-Holstein** | 13,040 | 398½ | 72¾ | 25¼ | 16,939<br>T.S. & C. | Schichau<br>Germania | 1906 | 1908 | 1,214,000 | 9½–4<br>K.S. | 3 | 8<br>K.S. | 6<br>K.S. | 11–6<br>K.S. | 6¾<br>K.S. | 4 *11-in.*, 14 *5·9-in.*, 20 *3·4-in.*, 2 *12-pr.*, 4 M. | 5<br>(sub.) | 19·2<br>19·5<br>*t* | 700<br>1800 | 743 |

The Hannover in the Baltic and the Braunschweig in the North Sea have been the only battleships in commission. The Lothringen and Preussen are out of the service.

Light cruisers Medusa, Thetis, and Amazone (2630 tons), completed 1901; Arkona, 1903; Hamburg, 1904; Berlin, 1905, all mounting ten *4·1-in.* guns. Also the Nymphe and Niobe (1899, 1901), these two to retain armament, but to have no ammunition on board. Both are now out of the service. The Arkona, Hamburg, and Berlin are alone considered to retain any real value, but nearly all the light vessels have been cruising. The light cruiser which is in hand at Wilhelmshaven, to replace an older vessel, is the Dresden, 5600 tons, length 508 ft. 6 ins., beam 46 ft. 9 ins., draught 16 ft. 4 ins., 29,000 h.-p., 8 *6-in.*, 3 *22-pr.*, 4 T.T.

Destroyers: S., 23; S., 18: G., 11, 10, 8, 7; V. 6, 5, 3, 2, 1; T. 196. In reserve (to retain armament), S. 19; T. 190, 185, 175.

Torpedo-boats: T. 168, 158, 157, 156, 154, 153, 151, 149, 146, 143, 141, 139. In reserve (to retain armament) T. 152, 148, 144, 135. Only about five of the torpedo-boats are accounted as other than obsolescent.

Surveying vessels Meteor and Panther. Gunboats Drache, Fuchs, Hay, Delphin.

## GREECE.—Armoured Ships.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. | | Guns. | Torpedo Tubes. | | | |
| | | | | | | | | | | | | | | | Heavy Guns. | Second-ary. | | | | | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *a c.* | **Giorgios Averoff** *See p.* 471. | 9956 | 429¾ | 69 | 24¾ | 20,000<br>B | Leghorn (Orlando) | 1910 | 1911 | 1,100,000 | 8–3½<br>K.S. | 1¾ | 7 | 7 | 8–6½ | 7 | 4 *9·2-in.*, 8 *7·5-in.*, 16 *3-in.*, 4 *3-pr.*, 1 *12-pr.* A.A. | 3<br>(sub.) | 24·0<br>*t.* | 700<br>1600 | .. |
| *b.*<br>*b.* | **Kilkis** (*ex* Mississippi)<br>**Lemnos** (*ex* Idaho) *See p.* 471. | 13,000 | 375 | 77 | 24¾ | 13,607<br>B.&W | Philadelphia | 1905 | 1908 | 616,360 | 9–4<br>K.S. | 3½–1<br>K.S. | 7<br>K.S. | 7<br>K.S. | 10–7½<br>K.S. | 6<br>K.S. | 4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 14 smaller | 2<br>(sub.) | 17·1<br>*t.* | 750<br>1820 | 725 |

The old battleships Hydra, Psara, and Spetsai are used in the training service.

## GREECE.—Cruising Ships.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | Armament. | | Speed. | Fuel. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Deck. | Gun Position. | Guns. | Torpedo Tubes. | | Coal.<br>Oil. | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | | | knots. | tons. | |
| *cr.* | **Helle** (*ex* Fei-Hung) | 2600 | 330 | 39 | 14 | 6500<br>tur. | Camden, N.J. | 1912 | 1914 | 240,000 | ¾ | .. | 2 *6-in.*, 4 *4-in.*, 4 *6-pr.*, 1 A.A. | 2 | 20 | 600<br>100 | .. |

*Torpedo depôt-ship.*—Kanaris, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 14 knots speed. Mine-layers Aigialia, Monemvasia, Naupactin, Myconos. Five old gunboats and four corvettes. Three ex-British motor launches. Several armed merchantmen.

# ITALY.—Armoured Ships.

| Class. | NAME.<br>DATE FOR SCRAPPING.* | Displacement. | Length. | | Beam. | | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. Belt. | Armour. Deck. | Armour. Side above Belt. | Armour. Bulkhead. | Gun Position. Heavy Guns. | Gun Position. Second-ary. | Armament. Guns. | Armament. Torpedo Tubes. | Speed. | Fuel. Coal. / Oil. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tons. | ft. | ins. | ft. | ins. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| b. | **Andrea Doria**<br>1937 | 22,600 | 554 | 4 | 92 | 0 | 29 | 32,000<br>P. tur.<br>Y. | Spezia . | 1913 | 1915 | .. | 10-4<br>K.S. | 1¾ | 6<br>K.S. | .. | 9½<br>K.S. | 6<br>K.S. | 13 *12-in.*, 16 *6-in.*, 13 *14-pr.*, 6 *14-pr.* A.A., 2 M., 4 L. | 3<br>(sub.) | 22 | 1200<br>800 | 1074 |
| b. | **Caio Duilio** .<br>1936 *See p.* 472. | | | | | | | | Castellammare | 1913 | 1915 | | | | | | | | | | | | |
| b. | **Conte di Cavour** .<br>1936 *See p.* 473. | 22,023 | 554 | 4 | 92 | 0 | 29 | 24,000<br>Parsons<br>B. & W. | Spezia . | 1911 | 1915 | .. | 10–4½<br>K.S. | 1¾ | 6<br>K.S. | .. | 9½<br>K.S. | 5<br>K.S. | 13 *12-in.*, 18 *4·7-in.*, 13 *14-pr.*, 6 *14-pr.* H.A. | 3<br>(sub.) | 22·0 | 1300<br>850 | 999 |
| b. | **Dante Alighieri** .<br>1931 *See p.* 474. | 19,400 | 519 | 8½ | 87 | 5 | 29 | 35,000*t*<br>Parsons<br>Bl. | Castellammare | 1910 | 1912 | .. | 9½–4½<br>K.S. | 1½ | 6<br>K.S. | .. | 10<br>K.S. | 4 | 12 *12-in.*, 20 *4·7-in.*, 12 *14-pr.*, 6 *14-pr.* H.A. | 3<br>(2sub.) | 23·0<br>*t* | 1300<br>750 | 900 |
| b. | **Giulio Cesare** .<br>1935 *See p.* 473. | 22,023 | 554 | 4 | 92 | 0 | 28 | 34,000<br>P. B.&W.<br>P. Bl. | Genoa<br>(Ansaldo) | 1911 | 1914 | .. | 10–4½<br>K.S. | 1¾ | 6<br>K.S. | .. | 9½<br>K.S. | 5<br>K.S. | 13 *12-in.*, 18 *4·7-in.*, 13 *14-pr.*, 6 *14-pr.* H.A. | 3<br>(sub.) | 22·0<br>*t* | 1300<br>850 | 999 |
| b. | **Napoli** . . | 12,660 | 435 | 0 | 73 | 6 | 27¼ | 20,000<br>B.&W. | Castellammare | 1905 | 1909 | 1,120,000 | 9¾–4<br>H.S. | 2 | 8<br>H.S. | 8<br>H.S. | 8<br>H.S. | 6<br>H.S. | 2 *12-in.*, 12 *8-in.*, 16 *14-pr.*, 2 *3-pr.* | 2<br>(sub.) | 22·0 | 2000<br>Coal | 711 |
| a.c. | **Pisa** . .<br>*See p.* 475. | 10,600 | 426 | 6 | 68 | 11 | 24¾ | 18,000<br>B. | Leghorn<br>(Orlando) | 1907 | 1908 | .. | 8–3½<br>K.S. | 1¾ | 7<br>K.S. | 7<br>K.S. | 8–6<br>K.S. | 6½ | 4 *10-in.*, 8 *7·5-in.*, 14 *14-pr.*, 6 *14-pr.* H.A. | 3<br>(sub.) | 23·0 | 1600<br>Coal | 687 |
| b. | **Roma** . . | 12,660 | 435 | 0 | 73 | 6 | 27¼ | 20,000<br>B. & W. | Spezia . | 1907 | 1909 | 1,120,000 | 9¾–4<br>H.S. | 2 | 8<br>H.S. | 8<br>H.S. | 8<br>H.S. | 6<br>H.S. | 2 *12-in.*, 12 *8-in.*, 16 *14-pr.*, 2 *3-pr.* | 2<br>(sub.) | 22·0 | 2000<br>Coal | 711 |
| a.c. | **San Giorgio** | 10,800 | 429 | 10 | 69 | 0 | 24¾ | 18000<br>Bl.<br>18000<br>tur. | Castellammare | 1908 | 1910 | .. | 8–3½<br>K.S. | 1¾ | 7<br>K.S. | 7<br>K.S. | 7–6<br>K.S. | 7<br>K.S. | 4 *10-in.*, 8 *7·5-in.*, 10 *14-pr.*, 6 *14-pr.* H.A. | 3<br>(sub.) | 22·5<br>23 0 | 1600<br>Coal | 643 |
| a.c. | **San Marco** .<br>*See p.* 475. | 10,000 | | | | | | | | | | | | | | | | | | | | | |

The Leonardo da Vinci, sister of the Giulio Cesare, was raised and taken into dock with the intention of reconstruction, but there is now no intention to complete her for service. She has been removed from the Italian Navy List. The old battleships Regina Elena and Vittorio Emanuele have also been removed, but the Napoli and Roma of the same class remain. The old armoured cruiser Francesco Ferruccio is now employed for the training of cadets. Monitor Faa di Bruno, 2,809 tons, 2 *15-in.*, 4 *14-pr.*, A.A. There are also four small river monitors, Monte Cengio, Monte Rovegno, Monte Grappa, and Montello, 575 tons, one *15-in.*, one machine-gun.

In the case of the Napoli and Roma the date of scrapping under the Treaty of Washington has not been indicated.

# ITALY.—Cruising Ships.

| Class. | NAME. | Displacement. | Length. |  | Beam. |  | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. |  | Armaments. |  | Speed. | Fuel. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  |  |  | Side. Deck. | Gun Position. | Guns. | Torpedo Tubes. |  |  |  |
|  |  | tons. | ft. | ins. | ft. | ins. | ft. |  |  |  |  | £ | in. | in. |  |  | knots. | tons. |  |
| *l. cr.* | Trieste Class (2 vessels) | 10,000 | .. |  | .. |  | .. | .. | .. | Bldg. | .. | .. | .. | .. | 8-*in.* | .. | 34½ | • | .. |
| „ | **Ancona** (*ex* German Graudenz) *See p.* 478. | 4842 | 456 | 0 | 45 | 0 | 17 | 27,400 | Kiel | 1913 | 1914 | .. | 4–2½<br>1 | .. | 7 *5·9-in.*, 2 *22-pr.* A.A., 120 mines | 4 (2sub.) | 27·5 | 1279 | .. |
| *Scout* | **Aquila** | 1550 | 310 | 0 | 31 | 0 | 10½ | 39,800 | Naples (Pattison) | 1915 | 1916 | .. | .. | .. | 5 *4·7-in.*, 4 *14-pr.* A.A., carries 100 mines | 4 | 35·0 | 260<br>Oil. | 160 |
| „ | **Augusto Riboty** | 1800 | 331 | 0 | 32 | 0 | 10½ | 43,100 | Genoa (Ansaldo) | 1915 | 1916 | .. | .. | .. | 8 *4-in.*, 2 *2-pr.* A.A.; carries 100 mines | 4 | 35·0 | 350<br>Oil. | 160 |
| *l. cr.* | **Bari** (*ex*-German Pillau) *See p.* 476. | 4320 | 441 | 0† | 46 | 0 | 19½ | 27,400 turb. | Danzig (Schichau) | 1914 | 1914 | .. | —<br>1½–¾ | 1 | 8 *5·9-in.*, 3 *3·4-in.* A.A. (Rearmed). Can carry 120 mines. | 2 | 27·5 | 1000 | 372 |
| „ | **Brindisi** (*ex*-Austrian Helgoland) *See p.* 477. | 3440 | 416 | 9 | 42 | 0 | 15½ | 25,000 Tur. | Fiume | 1912 | 1914 | .. | 2½<br>¾ | .. | 9 *3·9-in.*, 1 3-*in.* H.A. | 6 | 27·0 | 450<br>850 | 320 |
| „ | **Campania** | 2444 | 250 | 6 | 41 | 6 | 14·6 | 5000 | Castellammare | 1914 | 1916 | .. | 1 | .. | 6 *6-in.*, 5 l., 2 M | 2 | 17·0 | 700 | 240 |
| *Scout* | **Carlo Mirabello** | 1800 | 331 | 0 | 32 | 0 | 10½ | 43,100 | Genoa (Ansaldo) | 1914 | 1916 | .. | .. | .. | 8 *4-in.*, 2 *2-pr.* A.A.; carries 100 mines | 4 | 35·0 | 350<br>Oil. | 160 |
| „ | **Falco** | 1550 | 310 | 0 | 31 | 0 | 10½ | 38,100 | Naples (Pattison) | 1917 | 1918 | .. | .. | .. | 5 *4·7-in.*, 4 *14-pr.* A.A.; carries 50 mines | 2 dbl. | 35·0 | 260<br>Oil. | 160 |
| „ | **Leone** | 2158 | 359 | 6 | 33 | 6 | 11¼ | 42,000 turb. | Genoa (Ansaldo) | Bldg. | .. | .. | .. | .. | 8 *4·7-in.*, 2 *14-pr.* A.A., 2 M.; mining equipment | 6 | 34·0 | 400<br>Oil. | .. |
| *l. cr.* | **Libia** | 4000 | 341 | 6 | 47 | 6 | 16 | 12,500 | Genoa (Ansaldo) | 1912 | 1913 | .. | —<br>1½ | .. | 2 *6 in.*, 8 *4·7-in.*, 14 smaller | 2 | 22·0 | 630<br>Coal. | 300 |
| „ | **Marsala** *See p.* 477. | 3600 | 430 | 0 | 42 | 0 | 13¼ | 22,500 P.tur.Bl. | Castellammare | 1912 | 1914 | .. | —<br>1½–¾ | .. | 6 *4·7-in.* and 6 *14-pr.*, 2 *2-pr.* H.A., 150 mines | 2 | 28·0 | 800 | 240 |

† Water line.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *l. cr.* . | **Nino Bixio** . . *See p. 477.* | 3600 | 430 | 0 | 42 | 9 | 13¼ | 22,500 Bl.Cur.t. | Castellammare . | 1911 | 1914 | .. | —<br>1½–¾ | .. | 6 *4·7-in.* and 6 *14-pr.*, 2 *2-pr.* H.A., 150 mines | 2 | 28·0 | 800 | 300 |
| *Scout* . | **Pantera** . . . | 2158 | 359 | 6 | 33 | 6 | 11¼ | 42,000 turb. | Genoa (Ansaldo) . | Bldg. | .. | .. | .. | .. | 8 *4·7-in.*, 2 *14-pr.* A.A., 2 M., mining equipment | 6 | 32·0 | 400 Oil. | 100 |
| „ . | **Premuda** . . (*ex* German V. 116) | 2500 | 334 | 6 | 36 | 0 | 14 | 45,000 approx. | Hamburg . . | 1918 | 1919 | .. | .. | .. | 4 *5·9-in.*, 2 *14-pr.* A.A. . | 4 *23·6 in.* | 35·0 | 720 Oil. | .. |
| *l. cr.* . | **Quarto** . . . *See p. 478.* | 3220 | 413 | 6 | 43 | 9 | 13¼ | 29,000 P.tur.Bl. | Venice . . . | 1911 | 1912 | .. | —<br>1½–¾ | .. | 6 *4·7-in.* and 6 *14-pr.*, 2 *2-pr.* H.A., 150 mines | 2 | 28·0 | 450 | 240 |
| *l. cr.* . | **Taranto** (*ex*-German Strassburg) *See p. 476.* | 4480 | 446 | 3† | 43 | 6 | 15¾ | 33,742 *t* P. tur. | Wilhelmshaven . | 1912 | 1912 | 416,340 | 4–2½<br>— | 2 | 7 *5·9-in.*, 2 *3·4-in.* A.A., 2 M. (Rearmed). Can carry 120 mines. | 2 (sub.) | 28·28 *t* | 1200 | 373 |
| *Scout* . | **Tigre** . . . | 2158 | 359 | 6 | 33 | 6 | 11¼ | 42,000 turb. | Genoa (Ansaldo) . | Bldg. | .. | .. | .. | 8 | 8 *4·7-in.*, 2 *14-pr.* A.A., 2 M., mining equipment | 6 | 34·0 | 400 Oil. | .. |
| *l. cr.* . | **Venezia** (*ex*-Austrian Saida) *See p. 477.* | 3440 | 416 | 9 | 42 | 0 | 15½ | 25,000 Tur. | Monfalcone . | 1912 | 1914 | .. | 2½<br>1 | .. | 9 *3·9-in.*, 1 *3-in.* H.A. . . | 6 | 27·0 | 450<br>850 | 320 |

The scouts have been built to act also as flotilla leaders.

Etna (3474 tons), converted into a training ship. Eight mine-layers under construction, 600 tons, 10 knots, 200 mines: Albona, Laurana, Rovigno, ex-M. 130, 131, 132; Brondolo, Marghera, 115 tons, 13 knots. Nine mine-sweepers. Coal and liquid fuel transport Bronte (9490 tons); also Tevere, Prometeo, Cocito, Lete, Stige, Niobe, Cerrere, Istria, Dalmazia; building Tarvisio, Quarnero. Oil transport with under-water protection, Brennero. Anteo, submarine salvage vessel, 21,000 tons, 6 knots, raising 400 tons. Lagoon and river gunboats, Contida, Castore, Monte Santo, Vespa, Vodice, Ape, Cucco, Pasubio, Boeo, Cirenaica, Palmaiola, Toselli, Arimondi, S. Caboto, Alula, Calabria, E. Carlotto. Escort gunboats, A. Bafile, T. Farinati, E. Giovannini, C. del Greco, A. Vitturi. Surveying vessel, Ammiraglio Magnaghi, 1800 tons, 14 knots. About 50 various patrolling vessels and 10 gunboats. During the war a great number of motor chasers (M.A.S.) were bought and built, and at the beginning of 1921 about 350 of these were still on the list, but many have since been scrapped and sold. Transports Bengasi, Eritrea, Garigliano.

† Water line.

# JAPAN.—Armoured Ships.

From this list the ships to be scrapped under the Washington Treaty, both those built and building, have been removed with one exception as a record.

| Class. | NAME. DATE FOR SCRAPPING. | Displacement. | Length. | | Beam. | | Draught. | | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Fuel. Coal. Oil. | Complement.† |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. Heavy Guns. | Gun Position. Secondary. | Guns. | Torpedo Tubes. | | | |
| | | tons. | ft. | ins. | ft. | ins. | ft. | ins. | | | | | | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *A.c.* | **Akagi** * | 33,000 | 850 | 0 | .. | | .. | | 170,000 (G.) | Kure<br>Yokosuka | Bldg. | .. | .. | .. | .. | .. | .. | .. | .. | 8 *16-in* | .. | 33·0 | .. | .. |
| *A.c.* | **Amagi** * | | | | | | | | | | | | | | | | | | | | | | | |
| *b.* | **Fuso** . 1937 *See p.* 481. | 30,600 | 630 | 0 | 94 | 0 | 28 | 6 | 40,000 tur. | Kure . | 1914 | 1915 | .. | 12 K.S. | 3 | 8 K.S. | .. | 12 K.S. | 6 K.S. | 12 *14-in.*, 16 *6-in.*, 4 *12-pr.* A.A. | 6 (sub.) | 22·5 | 4000<br>1000 | 1193 |
| *b.* | **Hyuga** . 1940 *See p.* 480. | 31,260 | 640 | 0 | 94 | 0 | 28 | 6 | 45,000 tur. | Nagasaki (Mitsubishi) | 1917 | 1918 | | | | | | | | 12 *14-in.*, 20 *5·5-in.*, 4 *12-pr.* A.A. | 6 (sub.) | 23·0 | 4000<br>1000 | 1360 |
| *b.c.* | **Haruna** 1935 | 27,500 | 653 | 6 | 92 | 6 | 27 | 0 | 64,000 My. P. t. My. C. t. | Kobe . (Kawasaki) | 1913 | 1915 | .. | 8–3 K.S. | 2¾ | 6 | .. | 10 K.S. | 6 K.S. | 8 *14-in.*, 16 *6-in.*, 4 *12-pr.*, A.A. | 8 (sub.) | 27·5 | 4000<br>1000 | 980 |
| ,, | **Hiyei** . 1935 *See p.* 482. | | | | 92 | 0 | 27 | 6 | | Yokosuka . | 1912 | 1914 | | | | | | | | | | | | |
| *b.* | **Ise** . 1939 *See p.* 480. | 31,260 | 640 | 0 | 94 | 0 | 28 | 6 | 45,000 P. tur. | Kobe . (Kawasaki) | 1916 | 1917 | .. | 12 K.S. | 3 | 8 K.S. | .. | 12 K.S. | 6 K S. | 12 *14-in.*, 20 *5·5-in.*, 4 *12-pr.* A.A. | 6 (sub.) | 23·0 | 4000<br>1000 | 1360 |
| *b.* | (**Kaga** ‡) . | 40,600 | 700 | 0 | .. | | .. | | .. | Kobe (Kawasaki) | 1921 | .. | .. | 14 K.S. | .. | .. | .. | .. | .. | 8 *16-in.*, 20 *5·5-in.*, 4 *12-pr.* A.A. | 8 | 23·5 | .. | .. |

* The seaplane or aircraft-carrying cruisers Akagi and Amagi are the former battle-cruisers of 40,000 tons, and of the same names, which names may be retained. Under the terms of the Treaty they are being converted into aircraft carriers. The Atago and Takao, of the same class, will not be laid down.

† The complements of Japanese ships vary considerably from time to time. Those given are according to the latest reports.

‡ It is understood that the Kaga will be converted into an aircraft carrier instead of the Amagi, the latter having been badly damaged by earthquake.

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *b.c.* | **Kirishima** . 1936 *See p.* 482. | 27,500 | 653 6 | 92 6 | 27 0 | 64,000 My.P. t. | Nagasaki . (Mitsubishi) | 1913 | 1915 | .. | 8-3 K.S. | 2¾ | 6 | .. | 10 K.S. | 6 K.S. | 8 *14-in.*, 16 *6-in.*, 4 *12-pr.*, A.A. | 8 (sub.) | 27·5 | 4000 1000 | 980 |
| ,, | **Kongo** . 1934 *See p.* 482. | 27,500 | 653 6 | 92 0 | 27 6 | 64,000 Y. P. t. | Barrow . | 1913 | 1913 | 2,500,000 | 8–3 K.S. | 2¾ | 6 | .. | 10 K.S. | 6 K.S. | 8 *14-in.*, 16 *6-in.*, 4 *12-pr.*, A.A. | 8 (sub.) | 27·5 | 4000 1000 | 980 |
| *b.* | **Mutsu** . 1942 | 33,800 | 660 6 | 95 0 | 30 0 | 46,000 G. | Yokosuka | 1920 | 1921 | .. | 12 K.S. | .. | .. | .. | .. | .. | 8 *16-in.*, 20 *5·5-in.*, 4 *12-pr.* A.A. | 8 (4 sub.) | 23·0 | 5500 Coal & Oil | 1336 |
| *b.* | **Nagato** . 1941 *See p.* 479. | | | | | | Kure . | 1919 | 1920 | | | | | | | | | | | | |
| *b.* | **Yamashiro** . 1938 *See p.* 481. | 30,600 | 630 0 | 94 0 | 28 6 | 40,000 tur. | Yokosuka . | 1915 | 1917 | .. | 12 K.S. | 3 | 8 K.S. | .. | 12 K.S. | 6 K.S. | 12 *14-in.*, 16 *6-in.*, 4 *12 pr.* A.A. | 6 (sub.) | 22·5 | 4000 1000 | 1193 |

The battleship Aso (*ex*-Bayan), 8100 tons, completed at La Seyne in 1903, is now classed as a mine-layer.
The armoured-cruisers Kasuga and Nisshin, 7630 tons, and the cruisers Asama, Adzuma, Idzumo, Iwate, and Yakumo, were classified as coast-defence ships.
The battleships and armoured-cruisers (classified as battle-cruisers in the Appendix to the Washington Treaty), are being scrapped under the Washington Treaty.

# JAPAN.—Cruising Ships, &c.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost | Armour. Side. / Deck. | Armour. Gun Position. | Armament. Guns. | Armament. Torpedo Tubes. | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | | | knots. | tons. | |
| *l.cr.* | **Chikuma** | 4950 | 440 | 46½ | 16¾ | 22,500 Cur. t. My. | Sasebo | 1911 | 1912 | .. | 2¼ | .. | 8 *6-in.*, 4 *3-in.*, 4 M. | 3 | 26 | 500<br>1000 | 413 |
| ,, | **Hirado** | 4950 | 440 | 46½ | 16¾ | 22,500 P. tur. My. | Kobe | 1911 | 1912 | .. | 2¼ | .. | 8 *6-in.*, 4 *3-in.*, 4 M. | 3 | 26 | 500<br>1000 | 390 |
| *A.c.* | **Hosho** | 9500 | 510 | 62 | 20¼ | 30,000 (G.) | Tsurumi (Asano) | 1921 | 1922 | .. | .. | .. | 4 *5·5-in.*, 2 *12-pr.* A.A. | .. | 25 | .. | .. |
| *l.cr.* | **Abukama** | 5570 | 500 | 46¾ | 15¾ | 90,000 | Uraga | 1922 | 1924 | .. | 2/— | .. | 7 *5·5-in.*, 2 *12-pr.* A.A. | 8 | 33·0 | .. | 450 |
| ,, | **Isudzu** | | | | | | Uraga | 1921 | 1923 | | | | | | | | |
| ,, | **Jintsu** | | | | | | Kawasaki | 1923 | .. | | | | | | | | |
| ,, | **Kinu** *See p.* 483. | | | | | | Kawasaki | 1921 | 1922 | | | | | | | | |
| ,, | **Kiso** *See p.* 483. | 5500 | 500 | 46¾ | 15¾ | 90,000 (G.) | Nagasaki | 1919 | 1921 | .. | 2/— | .. | 7 *5·5-in.*, 2 *12-pr.* A.A. | 8 | 33·0 | .. | 439 |
| ,, | **Kitakami** *See p.* 483. | | | | | | Sasebo | 1920 | 1921 | | | | | | | | |
| ,, | **Kuma** *See p.* 483. | | | | | | Sasebo | 1919 | 1920 | | | | | | | | |
| *p.v.* | **Mogami** | 1350 | 300 | 31½ | 9¾ | 8000 turbines | Nagasaki | 1908 | 1909 | .. | .. | .. | 2 *4·7-in.*, 4 *12-pr.* | 2 | 23·0 | 95<br>350 | 167 |
| *l.cr.* | **Nagara** | 5570 | 500 | 46¾ | 15¾ | 90,000 (G.) | Sasebo | 1921 | 1921 | .. | 2/— | .. | 7 *5·5-in.*, 2 *12-pr.* A.A. | 8 | 33·0 | .. | 439 |
| ,, | **Natori** *See p.* 483. | | | | | | Nagasaki (Mitsubishi) | 1922 | 1922 | | | | | | | | |
| ,, | **Oh-I** *See p.* 483. | 5500 | 500 | 46¾ | 15¾ | 90,000 (G.) | Kobe | 1920 | 1921 | .. | 2 | .. | 7 *5·5-in.*. 2 *12-pr.* A.A. | 8 | 33·0 | .. | 439 |
| ,, | **Sendai** *See p.* 483. | 5570 | 500 | 46¾ | 15¾ | 90,000 | Nagasaki (Mitsubishi) | 1923 | .. | .. | 2/— | .. | 75 *5-in.*, 2 *12-pr.* A.A. | 8 | 33·0 | .. | 450 |
| ,, | **Tama** *See p.* 483. | 5500 | 500 | 46¾ | 15¾ | 90,000 (G.) | Nagasaki (Mitsubishi) | 1920 | 1921 | .. | 2 | .. | 7 *5·5-in.*, 2 *12-pr.* A.A. | 8 | 33 | .. | 439 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| „<br>„ | **Tatsuta**<br>**Tenryu** *See p.* 483. | 3500 | 440 | 41 | 13 | 51.000 (G.) | Sasebo<br>Yokosuka | 1918 | 1919 | .. | .. | .. | 4 *5·5-in.*, 1 *12-pr.* H.A. | 6 | 33 | .. | 322 |
| „ | **Tone** | 4100 | 400 | 47 | 16¾ | 15,000 My | Sasebo | 1907 | 1909 | .. | 2½ | .. | 2 *6-in.*, 10 *4·7-in.*, 2 *12-pr.*, 2 l. | 3 | 23·0 | 300<br>900 | 401 |
| *l. cr.* | **Yahagi** | 4950 | 440 | 46½ | 16¾ | 22,500 P. tur. My. | Nagasaki | 1911 | 1912 | .. | 2¼ | .. | 8 *6-in.*, 4 *3-in.*, 4 M. | 3 | 26 | 500<br>1000 | 413 |
| *p.v.* | **Yodo** | 1250 | 280 | 32 | 9¾ | 6500 | Kobe | 1907 | 1908 | .. | .. | .. | 2 *4·7-in.*, 4 *12-pr.* | 2 | 22·0 | 125<br>340 | 166 |
| *l. cr.* | **Yubari** | 3100 | 435 | 39½ | 11¾ | 55,000 (Estimated.) | Sasebo | 1923 | 1923 | .. | .. | .. | 6 *5·5-in.* | 4 | 33 | .. | 328 |
| *l. cr.* | **Yura** *See p.* 483. | 5570 | 500 | 46¾ | 15¾ | 90,000 (G.) | Sasebo | 1922 | 1922 | .. | 2 | .. | 7 *5·5-in.*, 2 *12-pr.* A.A. | 8 | 33 | .. | 450 |

Four light cruisers, Furutaka, Kinugasa, Kako, and Aoba, were laid down 1922–23. These vessels are 7100 tons, 100,000 h.p., and armed with six 8-in. guns. The Nachi and Myoko, light cruisers of 10,000 tons, have also been laid down and four others are projected.

Submarine depôt ships Karasaki (*ex*-Ekaterinoslav), 6170 tons, 5 light guns; Komahasi and Nagaura Maru. Seaplane carrier Wakamiya, 7600 tons. Aircraft carrier Hosho (details above); also the ex-battle-cruisers Akagi and Amagi (or Kaga) to be converted into aircraft carriers (see table of armoured ships).

Repair ship Kwanto Maru, 10,000 tons. Colliers: Noshima, Maroto. Oil ships: 15,400 tons, Erimo, Notori, Shiretoko, Sunesaki Maru, Tsurugisaki, Namiya, Ondo, Iro, Tourumi, Sata, Shiriya, Hagatoma.

Gunboats Saga, 780 tons, Uji, 620 tons.

River gunboats Toba, 250 tons; Fushimi, 180 tons; Sumida, 126 tons; Ataka, 850 tons, two 4·7-in. guns, and 2 M.; also Katata, Hira, Hodzu, and Seta, 340 tons, completed 1923. Two 55-ft. C.M.B.'s with two 18-in. torpedoes. About 20 auxiliaries.

# NETHERLANDS.

| Class. | NAME | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. | | Guns. | Torpedo Tubes. | | | |
| | | | | | | | | | | | | | | | Heavy Guns. | Second-ary. | | | | | |
| | | tons | ft. | ft. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots | tons. | |
| *a.g.b.* | Brinio . . . | 540 | 171 | 28 | 9¼ | 1200 | Amsterdam . | 1912<br>1913 | 1915 | .. | 2<br>K.S. | ¾ | .. | .. | .. | .. | 4 *4·1-in.* semi-automatic, 2 M. | .. | 14·5 | 34<br>Oil | 52 |
| „ | Friso . . . | | | | | | | | | | | | | | | | | | | | |
| „ | Gruno . . . | | | | | | | | | | | | | | | | | | | | |
| *c.d.s.* | De Ruyter . . *See p. 484.* | 5000 | 316¾ | 51½ | 19 | 6377<br>*t.* | Rotterdam . | 1901 | 1904 | 347,500 | 6–4<br>H.N.S. | 2 | .. | .. | 10<br>H.N.S. | 3<br>H.S. | 2 *9·4-in.*, 6 *5·9-in.*, 4 *2·9-in.*, 4 *1·4-in.* | 3<br>2 sub. | 14·5<br>*t* | 830 | 347 |
| „ | Hertog Hendrik . *See p. 484.* | 5000 | 316¾ | 50 | 19 | 6282<br>*t.* | Amsterdam . | 1902 | 1903 | 347,500 | 6<br>H.N.S. | 2 | .. | .. | 10<br>H.N.S. | 3<br>H.S. | 2 *9·4-in.*, 6 *5·9-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 2 M. | 3 | 14·5 | 830 | 347 |
| „ | Jacob van Heemskerck | 4921 | 316¾ | 50 | 19 | 6396<br>*t.* | Amsterdam . | 1906 | 1908 | 347,500 | 6–4<br>H.N.S. | 2 | .. | .. | 10<br>H.N.S. | 6<br>H.N.S. | 2 *9·4-in.*, 6 *5·9-in.*, 6 *2·9-in.*, 4 *1·4-in.*, 2 l. | 2<br>1 sub | 14·5 | 610 | 351 |
| *l. cr.* | Java . . . | 7000 | 509½ | 52½ | 18 | 65,000 | Flushing . | 1921 | 1924 | .. | 3 | .. | .. | .. | .. | .. | 10 *5·9-in.*, 4 *13-pr.* A.A., 4 M. | — | 30 | 1050<br>Oil | — |
| „ | Sumatra . . . | | | | | | Amsterdam | 1920 | — | | | | | | | | | | | | |
| „ | Marten Tromp . *See p. 484.* | 5210 | 330 | 50 | 18¾ | 6405<br>*t* | Amsterdam . | 1904 | 1906 | 347,500 | 6–4<br>H.N.S. | 2 | .. | .. | 10<br>H.N.S. | 3<br>H.S. | 2 *9·4-in.*, 4 *5·9-in.*, 8 *2·9-in.*, 4 *1·4-in.*, 2 M. | 3<br>2 sub. | 14·5<br>*t* | 830 | 349 |
| „ | De Zeven Provincien | 6426 | 339½ | 56 | 20¼ | 8516<br>Y | Amsterdam . | 1909 | 1910 | .. | 6–4<br>K.S | 2 | .. | .. | 10<br>K.S. | 4<br>K.S. | 2 *11-in.*, 4 *5·9-in.*, 10 *2·9-in.* semi-auto., 2 M. | .. | 15·3 | 1030 | 409 |

The Zeven Provincien is assigned to the Fleet of the Dutch East Indies. Light cruisers: Gelderland (1900), 4030 tons, now used as gunnery school; Zeeland (1897), 3900 tons, two 5·9-in., eight 4·7-in., two 2·9-in., four 1·4-in., 2 M., 19·4 knots. Four gunboats for the defence of the Zuyderzee. There are modern mine-layers, Medusa, Hydra, and Mataram, and Van Meerlant and Douwe Aukes, 750 tons, three 2·9-in. semi-auto., completed 1922; two others, Havik and Vulcanus, and six old vessels converted to the same use. Four mine-sweepers (I.–IV.), 275–300 tons, 1 machine-gun. In 1923 two old gunboats are in commission in the East Indies, and there are four mine-layers, Assahan, Serdang, Siboga, and Hercules. Surveying vessels in the East Indies, Van Gogh, Van Doorn, Lombok, Sumbawa, Tydeman. Depôt ship for submarines (Pelikaan), 2187 tons, four 2·9-in. semi-auto., 3 M., 1400 H P. (electic drive), speed 12 knots, completed August, 1922 (East Indies).

# NORWAY.—Armoured Ships.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. Heavy Guns. | Gun Position. Second-ary. | Guns. | Torpedo Tubes. | | | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | n. | | | in. | in. | | | knots. | tons. | |
| *c.d.s.* | **Eidsvold** .<br>**Norge** .<br>*See p.* 484. | 4233 | 290 | 50½ | 16½ | 4500<br>Y. | Elswick | 1900 | 1901 | 350,000 | 6<br>H.N.S. | 2 | .. | .. | 6<br>H.N.S. | 6<br>H.N.S. | 2 *8·2-in.* 6 *6-in.*, 8 *12-pr.*, 6 *3-pr.* | 2<br>sub. | 16·9<br>*t* | 400<br>600 | 270 |
| ,, | **Harald Haarfagre** . . | 3920 | 280 | 48½ | 16½ | 3700 | Elswick | 1896 | 1898 | 300,000 | 7<br>H.S. | 2 | .. | .. | 8<br>H.S. | .. | 2 *8-in.*, 6 *4·7-in.*, 6 *12-pr.*, 6 *1½-pr.* | 2<br>sub. | 17·2<br>*t* | 200<br>500 | 249 |
| ,, | **Tordenskjold** | | | | | | | 1897 | 1899 | | | | | | | | | | | | |

# Cruising Ships.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | Armament. | | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Deck. | Gun Position. | Guns. | Torpedo Tubes. | | | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | | | knots. | tons. | |
| *g.b* | **Æger** . . . | 387 | 108½ | 29½ | 8 | 450 | Horten . | 1892 | 1893 | .. | 1½ | .. | 1 *8·2-in.*, 1 *2·7-in.*, 2 *1·9-in.* . . . | .. | 9·0 | .. | 43 |
| *g.b.* | **Frithjof** . .<br>(training) | 1349 | 216½ | 32¾ | 13½ | 2800 | Horten . | 1896 | 1898 | .. | .. | .. | 2 *4·7-in.*, 6 *12-pr.*, 4 *1·4-in.*, 2 l. . . | 3<br>sub. | 15·0 | 120 | 166 |

Mine-layers Fröya (1916), 760 tons, 22 knots, 100 mines; Glommen and Laugen (1916), 350 tons, 10 knots, 50 mines; seven old gunboats refitted as minelayers, 280 tons. Submarine depôt and repair ships Sarpen, refitted 1918, 1920 tons; Ellida, 1000 tons. Two oil transports.

# RUSSIA—Armoured Ships.

| Class | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Makers of Engines. | Date of Launch. | Date of Completion. | Cost. | Armour. Belt. | Armour. Deck. | Armour. Side above Belt. | Armour. Bulkhead. | Armour. Gun Position. Heavy Guns. | Armour. Gun Position. Second-ary. | Armament. Guns. | Armament. Torpedo Tubes. | Speed. | Fuel. Coal. Oil. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tons. | ft. | ft. | ft. | | | | | | | in. | in. | in. | in. | in. | in. | | | knots. | tons | |
| *b.* | Pariskaia Kommuna | 23,000 | 594 | 87 | 27½ | 50,000 | Baltic Works | Baltic Works | 1911 | 1915 | .. | 9–5 | 3 | .. | .. | 12–10 | 6 | 12 *12-in.*, 16 *4·7 in*, 2 *9-pr.* A.A., 1 *3-pr.* | 4 | 23 | 3000 | — |
| *b.* | Marat | 23,000 | 594 | 87 | 27½ | 50,000 | | | 1911 | 1914 | | | | | | | | | | | | |
| *b.* | Poltava | 23,000 | 594 | 87 | 27½ | 50,000 | .. | .. | 1911 | 1915 | | | | | | | | | | | | |

# Cruising Ships.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where built. | Date of Launch. | Date of Completion. | Cost. | Armour. Belt. / Deck. | Armour. Gun Position. | Armament. Guns. | Armament. Torpedo Tubes | Speed. | Fuel. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | | | knots. | tons. | |
| | Svietlana | 6800 | 507¾ | 50⅓ | 18⅓ | 50,000 | Reval (towed to Petrograd) | 1915 | 1923 | .. | 3<br>1 | 3 | 15 *5·1-in.*, 4 *4-in.* A.A., 4 *3-in.*, 4 M. Can carry mines. | 2 | 29½ | 1170 Coal and oil | .. |
| | Admiral Butakov | | | | | | | Bldg. | .. | | | | | | | | |
| | Admiral Grieg | | | | | | | Bldg. | .. | | | | | | | | |
| | Admiral Spiraidov | | | | | | | Bldg. | .. | | | | | | | | |

## SPAIN.—Armoured Ships.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. | | Guns | Torpedo Tubes. | | | |
| | | | | | | | | | | | | | | | Heavy Guns. | Secondary. | | | | | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *b.* | **Alfonso XIII.** .<br>*See p.* 485. | 15,500 | 435 | 78¾ | 25½ | 15,500Y.<br>P. tur. | Ferrol . | 1913 | 1916 | .. | 9–4<br>K.S. | 2–1 | 6–5<br>K.S. | 6–3<br>K.S. | 10<br>K.S. | 3<br>K. | 8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M. | .. | 19·5 | 1850 | 735 |
| *a.c.* | **Cataluña** . . | 7405 | 347¾ | 61 | 23¼ | 10,580 | Cartagena . | 1900 | 1908 | 600,000 | 12–10 | 2 | .. | 12 | 10½ | .. | 2 9 *4-in.*, 8 *5·5-in.*, 8 *6-pr.*, 2 l., 10 *1-pr.* | .. | 18<br>*t* | 1178 | 546 |
| ” | **Emperador Carlos V.**<br>*See p.* 485. | 9900 | 404 | 67 | 27½ | 15,000 | Cadiz (Vea Murguia) | 1895 | 1898 | 734,000 | 2 | 6½–2 | 2 | .. | 10 | 2 | 2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *4·1-in.*, 10 *6-pr.*, 8 *1-pr.*, 2 M.. 2 l. | 2 | 19·0 | 2008 | 583 |
| *b.* | **España** * . | 15,460 | 435 | 78¾ | 25½ | 15,500Y.<br>P. tur. | Ferrol | 1912 | 1913 | .. | 9–4<br>K.S. | 2–1 | 6–5<br>K.S. | 6–3<br>K.S. | 10<br>K.S. | 3<br>K. | 8 *12-in.*, 20 *4-in.*, 2 *12-pr.*, 2 *3-pr.*, 2 M. | .. | 20·0<br>*t*<br>20·2 | 1305<br>1850 | 700 |
| *b.* | **Jaime I.** .<br>*See p.* 485. | 15,700 | 435 | | | | | 1914 | 1915 | | | | | | | | | | | | |
| *a.c.* | **Princesa de Asturias** | 7427 | 347¾ | 61 | 23¾ | 11,791 | Cadiz . | 1896 | 1902 | 600,000 | 12–10 | 2 | .. | 12 | 10½ | .. | 2 *9·4-in.*, 8 *5·5-in.*, 8 *6-pr.*, 2 l., 10 *1-pr.* | .. | 18·0 | 1007 | 546 |

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* In September, 1923, the España went ashore at Cape Tres Forcas. She was lightened, but unexpected difficulties occurred, and a Liverpool firm was called in to assist in salving the vessel.

# SPAIN.—Cruising Ships.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. |  | Armament. |  | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  | Side. Deck. | Gun Position. | Guns. | Torpedo Tubes. |  |  |  |
|  |  | tons. | ft. | ft. | ft. |  |  |  |  | £ | ins. |  |  |  | knots. | tons. |  |
| *l. cr.* | **Almirante Cervera** *See p. 486.* | 7850 | 545 | 54½ | 16½ | 80,000 | Ferrol | Bld. | — | .. | 3<br>— | .. | 8 *6-in.*, 4 *4-in.* A.A., 2 *3-pr.* | 12 | 33·0 | oil | .. |
| *g.b.* | **Bonifaz** | 787 | 213 | 30 | 9½ | 1100 Y | Cartagena | 1911 | 1912 | .. | .. | .. | 4 *14-pr.*, 2 M. | .. | 14·0 | 148 | 121 |
| *to.g.b.* | **Don Alvaro de Bazán** | 810 | 236 | 27 | 11¼ | 3577 | Ferrol | 1897 | 1899 | .. | .. | .. | 6 *6-pr.* 2 *2½-pr.*, 2 M. | .. | 19·0 | 168 | 121 |
| ,, | **Doña María de Molina** | 810 | 236 | 27 | 11¼ | 3500 | Ferrol | 1896 | 1898 |  |  |  | 8 *6-pr.* 2 *2½-pr.*, 2 M. |  |  |  |  |
| *l. cr.* | **Extremadura** | 2100 | 288 | 36 | 16¼ | 7000 T | Cadiz | 1900 | 1902 | .. | —<br>2 | .. | 8 *4-in.* (Vickers), 4 *6-pr.*, 4 *1-pr.* | .. | 19·0 | 425 | 266 |
| *g.b.* | **Lauria** | 787 | 213 | 30 | 9½ | 1100 Y | Cartagena | 1911 | 1912 | .. | .. | .. | 4 *3-in.*, 2 M. | .. | 14·0 | .. | 121 |
| ,, | **Laya** |  |  |  |  |  |  |  | 1911 |  |  |  |  |  |  |  |  |
| *to.g.b.* | **Marqués de la Victoria** | 810 | 233 | 26¾ | 11 | 2711 | Ferrol | 1897 | 1900 | .. | .. | .. | 8 *6-pr.*, 2 M. | .. | 19·0 | .. | 121 |
| *l. cr.* | **Principe Alfonso** *See p. 486.* | 7850 | 545 | 54½ | 16½ | 80,000 | Ferrol | 1924 | Bld. | .. | 3<br>— | .. | 8 *6-in.*, 4 *4-in.* A.A., 2 *3-pr.* | 12 | 33·0 | oil | .. |
| *g.b.* | **Recalde** | 787 | 213 | 30 | 9½ | 1100 Y | Cartagena | 1911 | 1911 | .. | .. | .. | 4 *3-in.*, 2 M. | .. | 13·8 | .. | 121 |
| *l. cr.* | **Reina Regente** | 5778 | 363 | 52½ | 16¼ | 11,000 W.T. | Ferrol | 1906 | 1910 | .. | .. | 3 | 10 *5·9-in.*, 12 *2·2-in.*, 2 l., 8 *1-pr.* | .. | 19·5 | 1178 | 452 |
| ,, | **Reina Victoria Eugenia** *See p. 487.* | 5700 | 462† | 50 | 15¾ | 25,000 P.T. | Ferrol | 1920 | 1922 | .. | 3–1½<br>— | .. | 9 *6-in.*, 4 *3-pr.* A.A., 1 *12-pr.*, 4 M., 1 l. | 4 (sub.) | 25·5 | 650 coal & oil | .. |
| ,, | **D. Blas Lezo**<br>**Mendez Nuñez** *See p. 487.* | 4700 | 439 | 46 | 14½ | 45,000 | Ferrol | 1923<br>1923 | Bldg.<br>1924 | .. | .. | .. | 6 *6-in.*, 4 *3-pr.* A.A., 4 M. | 4 | 29·0<br>29·05*t* | .. | .. |

**Coastal gunboat Canovas des Castelo, 1235 tons and 18 knots, completed 1923—two others in hand at Ferrol.**

Bonifaz, Lauria, Laya, Recalde, Don Alvaro de Bazan, Infanta Isabel, **Hernán Cortés**, **Vasco Nuñez** de **Balboa**, gun-boats of 800 tons.

Light cruiser Rio de la Plata, 1920 tons, converted to a mine-layer. Light gunboats Perla and Cartagenera, and motor-launches, M. 1–6, 40 tons (1919). Boys' training ship Galatea (*ex*-Claristella), 2500 tons, recently bought in Italy. Several mine-trawlers and auxiliaries. Submarine salvage vessel Canguru, 2100 tons (1916).

† Extreme.

# SWEDEN.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Coal. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. | | Guns. | Torpedo Tubes. | | | |
| | | | | | | | | | | | | | | | Heavy Guns. | Second-ary. | | | | | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *c.d.b.* | **Aeran** . . | 3650 | 287 | 49¼ | 16·7 | 6500<br>Y. | Gothenburg | 1901 | 1902 | .. | 7<br>K.S. | 1⅞ | .. | .. | 7½<br>K.S. | 5<br>K.S. | 2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 1 *1·4-in.* | 2<br>sub. | 17·2<br>*t* | 300 | 300 |
| ,, | **Dristigheten** . | 3620 | 285 | 48·5 | 17 | 5400<br>Y. | Gothenburg | 1900 | 1901 | .. | 8<br>K.S. | 1⅞ | .. | .. | 8<br>N.S. | 3¾<br>K.S. | 2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 1 *1·4-in.* | 2<br>sub. | 16·5 | 310 | 250 |
| ,, | **Drottning-Victoria**<br>*See p.* 488. | 7605 | 396·7 | 61 | 21½ | 22,000<br>tur. Y. | Gothenburg | 1917 | 1921 | 666,000 | 8–6<br>K.S. | 1½ | 4<br>H.S. | .. | 8<br>K.S. | 5<br>K.S. | 4 *11-in.*, 8 *6-in.*, 6 *12-pr.*, 2 *2·2-in.*, 2 M. | 2<br>sub. | 22·0<br>*t* | 350<br>800 | 450 |
| *a.c.* | **Fylgia** . . | 4980 | 377·6 | 48·5 | 20·6 | 12,440<br>Y. *t* | Stockholm . | 1905 | 1907 | 385,700 | 4<br>K.S. | 2 | .. | .. | 5<br>K.S. | 5<br>K.S. | 8 *5·9-in.*, 14 *2·2-in.*, 2 *1·4-in.* . | 2<br>sub. | 22·5<br>*t* | 350<br>900 | 341 |
| *c.d.b.* | **Gustav V.** .<br>*See p.* 488. | 7605 | 396·7 | 61 | 21½ | 22,000<br>tur. Y. | Malmö . . | 1917 | 1922 | 666,000 | 8–6<br>K.S. | 1½ | 4<br>H.S. | .. | 8<br>K.S. | 5<br>K.S. | 4 *11-in.*, 8 *6-in.*, 6 *12-pr.*, 2 *2·2-in.*, 2 M. | 2<br>sub. | 22·0 | 350<br>800 | 450 |
| ,, | **Manligheten** . | 3840 | 287 | 49¼ | 17·4 | 7400<br>Y. | Malmö . | 1903 | 1904 | .. | 7<br>K.S. | 1⅞ | .. | .. | 7½<br>K.S. | 5<br>K.S. | 2 *8·2-in.*, 6 *5·9-in.*, 8 *2·2-in.*, 1 *1·4-in.* | 2<br>sub. | 17·0 | 400 | 300 |
| ,, | **Oscar II** . .<br>*See p.* 488. | 4658 | 313·6 | 50·5 | 18 | 9000<br>Y. | Gothenburg | 1905 | 1907 | .. | 6<br>K.S. | 2 | 6<br>K.S. | 6<br>K.S. | 7½<br>K.S. | 5<br>K.S. | 2 *8·2-in.*, 8 *6-in.*, 10 *2·2-in.*, 4 *1·4-in.* | 2<br>sub. | 18·0 | 350<br>500 | 339 |
| ,, | **Sverige** . .<br>*See p.* 488. | 7605 | 396·7 | 61 | 21½ | 20,000<br>tur. Y. | Gothenburg | 1914 | 1917 | 666,000 | 8–6<br>K.S. | 1½ | 4<br>K.S. | .. | 8<br>K.S. | 5<br>K.S. | 4 *11-in.*, 8 *6-in.*, 6 *12-pr.*, 2 *2·2-in.*, 2 M. | 2<br>sub. | 22·0 | 350<br>800 | 450 |
| ,, | **Tapperheten** . | 3990 | 287 | 49¼ | 17·7 | 6000<br>Y. | Malmö . | 1901 | 1903 | .. | 7<br>K.S. | 1⅞ | .. | .. | 7½<br>K.S. | 5<br>K.S. | 2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 1 *1·4-in.* | 2<br>sub. | 16·5 | 330 | 300 |
| ,, | **Wasa** . . | 3745 | 287 | 49¼ | 17 | 6000<br>Y. | Stockholm . | 1901 | 1902 | .. | 7<br>K.S. | 1⅞ | .. | .. | 7½<br>K.S. | 5<br>K.S. | 2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 1 *1·4-in.* | 2<br>sub. | 16·5 | 330 | 300 |

All the ships are now rated as coast-defence battleships, with the exception of the Fylgia. Older coast-defence ships Oden, Thor, Niord (1897, 1899, 1899), 3715 tons, 2 9·8-in., 6 4·7-in. guns; Göta, 3400 tons, Thule, 3300 tons. Mine cruisers Clas Fleming, 1800 tons, 4 4·7 in., 20 knots, Edda; other mining vessels Sökaren, Sveparen, Sprängeren, and others. Torpedo gunboats Claes Horn, Jacob Bagge, Oernen, Psilander, 830 tons, 2 4·7-in., 4 2 2-in , 20 knots. Two gunboats, 512–589 tons. Depôt ships for submarines, Svea, 3300 tons, Skold, 600 tons.

## UNITED STATES.—Armoured Ships.

| Class. | NAME. DATE FOR SCRAPPING. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. § | Armour. | | | | | | Armament. | | Speed. | Fuel. Coal. Oil. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. Heavy Guns. | Gun Position. Second-ary. | Guns. | Torpedo Tubes. | | | |
| | | tons. | ft. | ft. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons. | |
| *b.* | **Arizona** . .<br>1937 *See p.* 492. | 31,400 | 596 | 97 | 28¾<br>† | 34,000<br>B. & W.<br>P. tur.<br>(G.) | New York .<br>(Navy Yard) | 1915 | 1916 | 1,485,000 | 14<br>K.S. | 3 | .. | .. | 18<br>K.S. | .. | 12 *14-in.* (45 cal.), 14 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.* | 2<br>(sub.) | 21·0 | 2300<br>Oil | 1002 |
| *b.* | **Arkansas** .<br>1935 *See p.* 495. | 26,000 | 554 | 93¼ | 28½<br>† | 28,533<br>P. tur. | Camden, N.J.<br>(N.Y.S.B.Co.) | 1911 | 1912 | 964,000 | 11–5<br>K.S. | 3 | .. | 8–6<br>K.S. | 11<br>K.S | 6½ | 12 *12-in.*, 16 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.* | 2<br>(sub.) | 20·5<br>*t* | 2700<br>400 | 1490 |
| *b.* | **California** .<br>1941 *See p.* 490. | 32,300 | 600 | 97½ | 30¼ | 28,500<br>Tur. (G.) | Mare Island<br>(Navy Yard) | 1919 | 1921<br>— | .. | 14<br>K.S. | .. | .. | .. | 18<br>K.S. | .. | 12 *14-in.* (50 cal.). 12 *5-in.*, 8 *14-pr.* A.A., 4 *6-pr.* | 2<br>(sub.) | 21·0<br>• | 3500<br>Oil | 1407 |
| *a. c.* | **Charleston** . | 9700 | 424 | 66 | 35<br>† | 27,500<br>B.&W. | Newport News | 1904 | 1906 | 563,030 | 4<br>H.S | 3 | 4<br>H.S. | .. | 4<br>H.S. | .. | 12 *6-in.*, 4 *3-in.*, 2 *3-in.* A.A., 10 M., 2 l. | .. | 22·0 | 1800<br>Coal. | 784 |
| *a.c.* | **Charlotte** (*ex* North Carolina) | 14,500 | 502 | 72¾ | 25<br>† | 29,785<br>B. & W. | Newport News | 1906 | 1908 | 970,630‡ | 5–3<br>K.S. | 3 | 5<br>K.S. | 6<br>K.S. | 9<br>K.S. | 5<br>K.S. | 4 *10-in.*, 16 *6-in.*, 12 *3-in.*, 2 *3-in.* A.A., 4 *6-pr.*, 15 M. & l. | 4<br>sub. | 21·9<br>*t* | 2000<br>Coal. | 964 |
| *b.* | **Colorado**. .<br>1942 *See p.* 489. | 32,600 | 600 | 97½ | 30½<br>† | 28,900<br>B. & W.<br>tur. | N.Y.S.B. Co. | 1921 | 1923<br>— | 1,383,000 | 13½–12<br>K.S. | .. | .. | .. | 18<br>K.S. | .. | 8 *16-in.* (45 cal.), 12 *5-in.*, 8 *3-in.* A.A., 4 *6-pr.* | 2<br>(sub.) | 21·0 | 2914<br>Oil | 1407 |

§ The sums given in this column are exclusive of the cost of armour and armament according to the system of making appropriations in the estimates.

† Mean draught.

‡ Including armour, but not armament.

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *b.* | **Florida** .<br>1934 *See p.* 496. | 21,825 | 510 | 88¼ | 28½<br>† | 27,036<br>B. & W.<br>P. tur. | New York .<br>(Navy Yard) | 1910 | 1911 | 1,280,000 | 11 | .. | 10 | .. | 11 | 5 | 10 *12-in.*, 16 *5-in.*, 8 *3-in.* A.A., 6 *3-pr.* | 2<br>(sub.) | 20·75<br>*t* | 2560<br>400 | 1014 |
| *a.c.* | **Frederick** .<br>(*ex* Maryland) | 13,680 | 502 | 69½ | 24½ | 28,059<br>B. & W. | Newport News | 1903 | 1905 | 756,400 | 6–3½<br>K.S. | 4 | 5<br>K.S. | 4<br>K.S. | 6<br>K.S. | 5<br>K.S. | 4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 2 *3-in.* A.A., 14 l. | 2<br>(sub.) | 22·4<br>*t* | 2100<br>Coal. | 898 |
| *a.c.* | **Huntington** .<br>(*ex* West Virginia) | 13,680 | 502 | 69½ | 24½ | 31,437<br>B. & W. | Newport | 1903 | 1905 | 798,310 | 6–3½<br>K.S. | 4 | 5<br>K.S. | 12<br>H.S. | 6<br>K.S. | 5<br>K.S. | 4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 2 *3-in.* A.A., 8 *1 pr.*, 4 M., 1 l. | 2<br>(sub.) | 22·1<br>*t* | 2100<br>Coal. | 898 |
| *a.c.* | **Huron** . .<br>(*ex* South Dakota) | 13,680 | 502 | 69½ | 26 | 28,598<br>B. & W. | S. Francisco. | 1904 | 1907 | 770,570 | 14<br>K.S. | 4 | 5<br>K.S. | 4<br>K.S. | 6<br>K.S. | 5<br>K.S. | 4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 2 *3-in.* A.A., 7 *1-pr.*, 1 l. | 2<br>sub. | 22·0<br>*t* | 2200<br>Coal. | 899 |
| *b.* | **Idaho** . .<br>1939 *See p.* 491. | 32,000 | 600 | 97½ | 30<br>† | 32,000<br>B. & W.<br>P. tur.<br>(G.) | Camden, N.J.<br>(N.Y.S.B. Co.) | 1917 | 1919 | 1,485,000 | 6–3½<br>K.S. | 3 | .. | .. | 18<br>K.S. | .. | 12 *14-in.* (50 cal.), 12 *5-in.*, 8 *14-pr.* A.A., 4 *3-pr.* | 2<br>(sub.) | 21·0 | 2914<br>Oil | 1440 |
| *A.C.* | **Lexington** . | 33,000<br>approx. | 874<br>* | 104 | 30<br>† | 180,000<br>tur.electric | Quincy, Mass. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 10 *8-in.* (?) | .. | .. | .. | .. |
| *b.* | **Maryland** .<br>1941 *See p.* 489. | 32,600 | 600 | 97¼ | 30½<br>† | 28,900<br>T. | Newport News | 1920 | 1921 | 1,383,000 | 13½–12<br>K.S. | .. | .. | .. | 18<br>K.S. | .. | 8 *16-in.* (45 cal.), 12 *5-in.*, 8 *3-in.* A.A., 4 *6-pr.* | 2<br>(sub.) | 21·0 | 2914<br>Oil | 1407 |
| *b.* | **Mississippi** .<br>1938 *See p.* 491. | 32,000 | 600 | 97¾ | 30<br>† | 32,000<br>B. & W.<br>Cur. t.<br>(G.) | Newport News | 1917 | 1917 | 1,485,000 | 14<br>K.S. | 3 | .. | .. | 18<br>K.S. | .. | 12 *14-in.* (50 cal.), 12 *5-in.*, 8 *14-pr.* A.A., 4 *6-pr.* | 2<br>sub. | 21·0 | 2914<br>Oil | 1440 |

* Extreme. † Mean draught.

# UNITED STATES.—Armoured Ships—*continued*.

| Class. | NAME.<br>DATE FOR SCRAPPING. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. | Armour. | | | | | | Armament. | | Speed. | Fuel. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Belt. | Deck. | Side above Belt. | Bulkhead. | Gun Position. Heavy Guns. | Gun Position. Second-ary. | Guns. | Torpedo Tubes. | | Coal.<br>Oil. | |
| | | tons | ft. | ft. | ft. | | | | | £ | in. | in. | in. | in. | in. | in. | | | knots. | tons | |
| *a.c.* | **Missoula** .<br>(*ex* Montana) | 14,500 | 502 | 72¾ | 27<br>† | 27,958<br>B. & W. | Newport News | 1906 | 1908 | 970,630‡ | 5–3<br>K.S. | 3 | 5<br>K.S. | 6<br>K.S. | 9<br>K.S. | 5<br>K.S. | 4 *10-in.*, 16 *6-in.* 2 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 10 *1-pr.*, 4 M., 1 l. | 4<br>sub. | 22·2<br>*t* | 2000<br>Coal | 964 |
| *b.* | **Nevada** . .<br>1936 *See p.* 493. | 27,500 | 575 | 95¼ | 28½<br>† | 23,312<br>Y.<br>Cur. tur. | Quincy, Mass. (Fore River) | 1914 | 1916 | 1,211,342 | 13½–8<br>K.S | 1½–3 | ..<br>K.S. | 13½<br>K.S. | 18–16<br>K.S. | .. | 10 *14-in.* (45 cal.), 12 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.* | 2<br>sub. | 20·5 | 2000<br>Oil | 1360 |
| *b.* | **New Mexico** .<br>1939 *See p.* 491. | 32,000 | 600 | 97¾ | 30<br>† | 27,500<br>B. & W.<br>Electric drive | New York . (Navy Yard) | 1917 | 1918 | 1,485,000 | 14<br>K.S. | 3 | .. | .. | 18<br>K.S. | .. | 12 *14-in.* (50 cal.), 12 *5-in.*, 8 *14-pr.* A.A., 4 *6-pr.* | 2<br>(sub.) | 21·0 | 2914<br>Oil | 1440 |
| . | **New York** .<br>1935 *See p.* 494. | 27,000 | 565 | 95¼ | 28½<br>† | 29,687<br>B. & W. | New York . (Navy Yard) | 1912 | 1914 | 1,315,114 | 12–4<br>K.S | 3 | 9<br>K.S. | 10<br>K.S. | 14–8<br>K.S. | 6<br>K.S. | 10 *14-in.* (45 cal.), 16 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.* | 4<br>sub. | 21·0 | 2918<br>400 | 1500 |
| *b.* | **Oklahoma** .<br>1936 *See p.* 493. | 27,500 | 575 | 95¼ | 29¾<br>† | 21,703<br>B. & W. | New York . | 1914 | 1916 | 2,200,000 | 13½–8<br>K.S. | 1½–3 | K.S. | 13½<br>K.S. | 18–16<br>K.S. | .. | 10 *14-in.* (45 cal.), 12 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.* | 2<br>sub. | 20·5 | 2000<br>Oil | 1360 |
| *b.* | **Pennsylvania** .<br>1937 *See p.* 492. | 31,400 | 596 | 97 | 29¾<br>† | 31,500<br>B. & W.<br>Cur. tur. | Newport News | 1915 | 1916 | 1,485,000 | 14<br>K.S. | 3 | .. | .. | 18<br>K.S. | .. | 12 *14-in.* (45 cal.), 14 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.* | 2<br>sub. | 21·0 | 2300<br>Oil | 1002 |
| *a.c.* | **Pittsburg** . | 13,680 | 502 | 69½ | 26 | 28,600<br>Nic. | Philadelphia (Cramp) | 1903 | 1905 | 799,340 | 6–3½<br>K.S. | 4 | 5<br>K.S. | 4<br>K.S. | 6<br>K.S. | 5<br>K.S. | 4 *8-in.*, 14 *6-in.*, 10 *3-in.*. 2 *3-in.* A.A., 4 *3-pr.*, 18 *1-pr.*, 8 M., 1 l. | 2<br>sub. | 22·4<br>*t* | 2100<br>Coal | 898 |
| *a. c.* | **Pueblo** . .<br>(*ex* Colorado) | 13,680 | 502 | 69½ | 24½ | 26,837<br>Nic. | Philadelphia | 1903 | 1905 | 756,000 | 6–3½<br>K.S. | 4 | 5<br>K.S. | 4<br>K.S. | 6<br>K.S. | 5<br>K.S. | 4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 2 *3-in.* A.A., 4 *3-pr.*, 12 *1-pr.*, 4 M., 1 l. | 2<br>(sub.) | 22·2<br>*t* | 2100<br>Coal | 898 |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *a.c.* | **St. Louis** . | 9700 | 424 | 66 | 22½<br>† | 27,264<br>B. & W. | Philadelphia<br>(Cramp) | 1905 | 1906 | 563,030 | 4<br>K.S. | 3 | 4–3 | .. | 4<br>K.S. | .. | 12 *6-in.*, 4 *3-in.*, 2 *3-in.* A.A.. 2 *3-pr.*, 12 l. & M. | .. | 22·1<br>*t* | 1800<br>Coal | 784 |
| *A.C.* | **Saratoga** . | 33,000<br>approx. | 874 | 104 | 30<br>† | 180,000<br>tur.electric | N.Y. Ship-building Co. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 10 *8-in.* (?) | .. | .. | .. | .. |
| *a.c.* | **Seattle** . (*ex* Washington) | 14,500 | 502 | 72¾ | 27 | 27,152<br>B. & W. | Camden, N.J. | 1905 | 1906 | 970,630‡ | 5–3<br>K.S. | 3 | 5<br>K.S. | 6<br>K.S. | 9<br>K.S. | 5<br>K.S. | 4 *10-in.*, 16 *6-in.*, 12 *3-in.*, 2 *3-in.* A.A., 4 *6-pr.*, 4 M., 11 l. | 4<br>sub. | 22·3<br>*t* | 2000<br>Coal | 964 |
| *b.* | **Tennessee** . 1940 *See p.* 490. | 32,300 | 600 | 97¼ | 30¼<br>† | 28,500<br>T. | New York Navy yard | 1919 | 1920 | .. | 14<br>K.S. | .. | .. | .. | 18<br>K.S. | .. | 12 *14-in.* (50 cal.), 12 *5-in.*, 8 *14-pr.* A.A., 4 *6-pr.* | 2<br>sub. | 21·0 | 2500<br>Oil | 1407 |
| *b.* | **Texas** . 1935 *See p.* 494. | 27,000 | 565 | 95¼ | 28½<br>† | 28,100<br>B. & W.<br>*t* | Newport News | 1912 | 1914 | 1,166,000 | 12–4<br>K.S. | 3 | 9<br>K.S. | 10<br>K.S. | 14–8<br>K.S. | 6<br>K.S. | 10 *14-in.* (45 cal.), 16 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.* | 4<br>sub. | 21·0<br>*t* | 2918<br>400 | 1500 |
| *b.* | **Utah** . 1934 *See p.* 496. | 21,825 | 510 | 88¼ | 28½ | 28,477<br>B. & W<br>*t.* P. tur | Camden, N.J | 1909 | 1911 | 813,500 | 11 | .. | 10 | . | 11 | 5 | 10 *12-in.*, 16 *5-in.*, 8 *3-in.* A.A., 4 *3-pr.* | 2<br>sub. | 20·75<br>*t* | 2560<br>400 | 1014 |
| *b.* | **West Virginia** 1942 *See p.* 489. | 32,600 | 600 | 97¼ | 30½<br>† | 28,900<br>T. | Newport News | 1921 | 1923 | 1,383,000 | 13½–12<br>K.S. | .. | | .. | 18<br>K.S. | .. | 8 *16-in.* (45 cal.), 12 *5-in.*, 8 *3-in.* A.A., 4 *6-pr.* | 2<br>sub. | 21·0 | 2841<br>Oil | 1407 |
| *b.* | **Wyoming** . 1934 *See p.* 495. | 26,000 | 554 | 93¼ | 29¾<br>† | 31,437<br>B. & W.<br>P. tur | Philadelphia | 1911 | 1912 | 963,800 | 11-9<br>K.S. | .. | .. | 8–6<br>K.S. | 11<br>K.S. | 8 | 12 *12-in.*, 16 *5-in.*, 8 *3-in.* A.A.. 6 *3-pr.* | 2<br>sub. | 20·5<br>*t* | 2750<br>400 | 1490 |

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§ See note on p. 414.

† Mean Draught.

‡ Including armour, but not armament.

# UNITED STATES.—Cruising Ships, &c.

| Class. | NAME. | Displacement. | Length. | Beam. | Draught. | Indicated Horse-Power. | Where Built. | Date of Launch. | Date of Completion. | Cost. $ | Armour. |  | Armament. |  | Speed. | Fuel. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |  | Deck | Gun Position. | Guns. | Torpedo Tubes. |  | Coal. Oil. |  |
|  |  | tons. | ft. | ft. | ft. |  |  |  |  | £ | in. | in. |  |  | knots. | tons. |  |
| g.r. | **Asheville** | 1575 | 225 | 41¼ | 11¼† | 800<br>P. tur. | Charleston | 1918 | 1919 | 176,718 | .. | .. | 3 *4-in.*, 2 *3-pr.* | .. | 12 | .. | 157 |
| *scout cr.* | **Birmingham** | 3750 | 420 | 47 | 18¾† | 15,670<br>Express | Quincy, Mass. | 1907 | 1908 | 301,000 | 2–1½ | .. | 4 *5-in.*, 2 *3-in.*, 1 *3-in.* A.A., 4 M. | 2<br>sub. | 24·3<br>*t* | 1433<br>Coal | 356 |
| p.r. | **Chattanooga** | 3200 | 292 | 44 | 17 | 5303<br>B.&W. | Elizabeth Port | 1903 | 1904 | 212,325 | 2 | .. | 6 *5-in.*, 1 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 2 M., 1 l. | .. | 16·65<br>*t* | 740<br>Coal | 302 |
| *scout cr.* | **Chester** | 3750 | 420 | 47 | 18¾† | 16,000<br>Nor. turb. | Bath, Me. | 1907 | 1908 | 337,000 | 2–1½ | .. | 4 *5-in.*, 2 *3-in.*, 1 *3-in.* A.A., 4 M. | 2<br>sub. | 26·5<br>*t* | 1433<br>Coal | 356 |
| ,,<br>,, | **Cincinnati**<br>**Concord**<br>*See p.* 497. | 7500 | 550 | 55 | 19† | 90,000 | Tacoma, Wash.<br>Philadelphia (Cramp) | 1921 | 1923 | Cost and fee | 2½<br>side | .. | 12 *6-in.*, 4 *3-in.* A.A., 2 *3-pr.* | 2 twin and 2 triple above water 21-in. | 33·7 | 2000<br>Oil. | 450 |
| p.r. | **Cleveland** | 3200 | 292 | 44 | 17 | 4640<br>B.&W. | Bath, Me. | 1901 | 1903 | 212,325 | 2 | .. | 6 *5-in.*, 1 *3-in.* A.A., 2 *1-pr.*, 2 M., 1 l. | .. | 16·4<br>*t* | 700<br>Coal | 302 |
| p.r.<br>,, | **Denver**<br>**Des Moines** | 3200 | 292 | 44 | 17 | 4135<br>B. & W. | Philadelphia<br>Quincy, Mass. | 1902 | 1904 | 212,325 | 2 | .. | 6 *5-in.*, 1 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 4 M., 1 l. | .. | 16·65 | 700<br>Coal | 303 |
| *scout cr.* | **Detroit**<br>*See p.* 497. | 7500 | 550 | 55 | 19† | 90,000 | Quincy, Mass. (Bethlehem) | 1923 | 1923 | Cost and fee. | 2½<br>side | .. | 12 *6-in.*, 4 *3-in.* A.A., 2 *3-pr.* | 2 twin and 2 triple above water 21-in. | 33·7 | 2000<br>Oil. | 450 |
| p.r. | **Galveston** | 3200 | 292 | 44 | 17 | 5073<br>B. & W. | Richmond, Va. | 1903 | 1904 | 212,325 | 2 | .. | 6 *5-in.*, 1 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr*, 4 M., 1 l. | .. | 16·4 | 700<br>Coal | 302 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *scout cr.*<br>„ | **Marblehead**<br>**Memphis** *See p. 497* | 7500 | 550 | 55 | 19† | 90,000 | Philadelphia (Cramp) | 1923 | 1924 | Cost and fee | 2½ side | .. | 12 *6-in.*, 4 *3-in.* A.A.; 2 *3-pr.* | 2 twin and 2 triple above water 21-in. | 33·7 | 2000 Oil | 450 |
| .. | **Milwaukee** *See p. 497.* | 7500 | 550 | 55 | 19† | 90,000 | Tacoma, Wash. | 1921 | 1923 | | | | | | | | |
| *scout cr.* | **Omaha** | 7500 | 550 | 55 | 19† | 90,000 | Tacoma, Wash. | 1920 | 1922 | Cost and fee | 2½ side | .. | 12 *6-in.*, 4 *3-in.* A.A.; 2 *3-pr.* | 2 twin and 2 triple above water 21-in. | 33·7 | 2000 Oil | 450 |
| „ | **Raleigh** | | | | | | Quincy, Mass. | 1922 | 1923 | | | | | | | | |
| „ | **Richmond** *See p. 497.* | | | | | | Philadelphia (Cramp) | 1921 | 1923 | | | | | | | | |
| *p.v.* | **Sacramento** | 1425 | 225 | 40¾ | 11½ | 1022 | Philadelphia | 1913 | 1914 | 101,200 | .. | .. | 3 *4-in.*, 2 *3-pr.*, 2 M., 2 l. | .. | 12·8 *t* | 428 | 156 |
| *scout cr.* | **Salem** | 3750 | 420 | 47 | 18¾ | 22,242 W.T. turb. | Quincy, Mass. | 1907 | 1908 | 301,000 | 2–1½ | .. | 4 *5-in.*, 2 *3-in.*, 1 *3-in.* A.A., 2 M. | 2 sub. | 25·9 *t* | 1433 Coal | 356 |
| *p.v.* | **Tacoma** | 3200 | 292 | 44 | 17 | 5288 B.&W. | S. Francisco. | 1903 | 1904 | 212,325 | .. | 2 shields | 6 *5-in.*, 1 *3-in.* A.A., 4 *6-pr.*, 2 *1-pr.*, 4 M. | .. | 16·6 *t* | 700 Coal | 302 |
| *sc. cr.* | **Trenton** *See p. 497.* | 7500 | 550 | 55 | 19† | 90,000 | Philadelphia (Cramp) | 1923 | 1924 | Cost and fee | 2½ side | .. | 12 *6-in.*, 4 *3-in.* A.A., 2 *3-pr.* | 2 twin and 2 triple above water 21-in. | 33·7 | 2000 Oil | 450 |
| *g.v.* | **Tulsa** | 1575 | 225 | 41¼ | 11¼† | 800 | Charleston | 1922 | 1923 | .. | .. | .. | 3 *4-in.*, 2 *3-pr.* | .. | 12 | .. | 157 |

§ Prices exclusive of armament. † Mean draught.

Eight cruisers of 10,000 tons displacement, mounting 8-in. guns, are projected, but the programme has not yet been approved by Congress.

Aircraft carriers Langley (*ex*-collier Jupiter), 19,360 tons, 7160 H.P. turbines and electric drive, four 5-in. guns, and carrying about 30 aeroplanes; also Wright (converted merchantman) and the *ex*-battle-cruisers Lexington and Saratoga, now being converted, and Patoka, airship tender. Patrolling and gun vessels Helena, Sacramento and New Orleans, 1000 to 1392 tons; thirteen others and 10 patrolling yachts. About fifty patrol vessels (Eagles) and submarine chasers. Fleet seaplane tender Aroostook and others adapted. Mine-laying vessels Baltimore, San Francisco, and Shawmut, carrying 5-in. and small anti-aircraft guns. A large number of mine-sweepers and tugs. Submarine tenders Beaver, Bushnell, Camden, Fulton, Rainbow, Savannah and Canopus. Destroyer depôt ships Altair, Derobela, Rigel, Black Hawk, Buffalo, Dixie, Dobbin, Leonidas, Meville, and Whitney. Repair ships Topeka, Villalobos, Bridgeport, 7594 tons, Medusa, 10,000 tons, Prometheus and Vestal, 12,595 tons. Supply ships Arctic, Bridge, Rappahanock. Hospital ships Comfort, Mercy, Relief, and Solace. Ulysses and Achilles, colliers, for the Panama Canal. Twelve other colliers and 13 oilers. River gunboats Monocacy and Palos, completed 1914. C.M.B. 1922, 2 18-in. torpedoes or depth-charges and 4 M., another with 18-in. torpedoes and 2 M.

Training ships Olympia, 5870 tons; Chicago, 4500 tons. Torpedo experimental vessel Montgomery, 2089 tons.

# SHIPS OF THE LESSER NAVIES.

**Austria.**—Patrol vessels: Neretva, Compo, Fogas and Pozsony.

**Belgium.**—The maritime affairs of Belgium are under the control of the Minister of National Defence, who is responsible for the administration of the defences by land, sea, and air. The nucleus of the Navy consists of the sloop *ex* Zinnia 16 knots, one 4·7-in. and two 12-prs., for fishery protection duties, and 14 *ex* German torpedo-boats, of which 11 were interned in Holland and 3 abandoned in November, 1918. These last have been named severally Prince Léopold, Prince Charles, and Princesse Marie José. Several of the others are now unfit for service.

**Bulgaria.**—Under the terms of the naval clauses of the Peace Treaty, Bulgarian warships of all classes, existing or under construction, were surrendered to the Allied and Associated Powers or broken up. All vessels are under the Ministry of Commerce for police and preventive duties; torpedo-boats Derzki, Khrabri, Smelyi, and Strogi, with some motor boats of little value.

**China.**—The naval situation is obscure. The Canton Government was understood to control the light cruisers Cha-Ho (Elswick, 1912, 2,600 tons, two 6-in., four 4-in., eight smaller guns), Hai Chi (Elswick, 1899, 4,300 tons, two 8-in., ten 4·7-in., twenty-two smaller guns), also Yu Chang and Hai Chen; the destroyers Chien Kang and Tung An (Elbing, 1912); the gunboats Yung Hsiang and Yung Peng; despatch vessel Wu Feng; river gunboat Chu Yu (No. 2) and the transport Fu An. The following vessels, constituting the first squadron, are mainly based on Chefoo: light cruisers Hai Chou and Hai Yeng (Stettin, 1898, 2,954 tons, three 6-in., eight 4-in., twelve machine guns); destroyer Chien Kang; gunboat Yung Chi; despatch vessels Yung Chien and Lien Ching and some armed launches. Second Yangtse flotilla: torpedo vessels Chien An and Chien Wei; torpedo boats, Chang, Chen, Hu Chun, Hu E, Hu Peng, Hu Yung, Lieh, and Su; river gunboats Chiang Chen, Chiang Hsi, Chiang Kun, Chiang Li, Chiang Yuan, Chien Chung, Chu Chien, Chu Tai, Chu Tung, Chu Yu (No. 1), Kung Chen, Yung An, Li Chieh, and Li Sui (the two last named *ex* German boats); training ship Tung Chi. The Kuang Tung flotilla recently comprised ten torpedo boats (Lei Chen, Lei Chung, Lei Fu, Lei Kan (No. 1), Lei Kan (No. 2), Lei Ken, Lei Kun, Lei Li, Lei Sun, and Lei Tui), but it is doubtful if all are efficient; also gunboats Chen Hang, Chen Tao, Fu Po, Kuang Chen, Kuang Chin, Kuang Heng, Kuang Li, Kuang Yuan, Lung Hsiang, and two others reported unfit for service; and river gunboats Chiang Ku, Chiang Kung, and Chiang Ta.

**Colombia.**—Gunboats, Chercinto, Bogota, Cauca, and four guardacostas. River gunboats, General Nerino and Esperanza, 400 tons.

**Cuba.**—Light cruiser, Cuba, 2055 tons, 6000 H.P. 18 knots, and the training ship Patria, 1220 tons, 16 knots; also 5 gunboats, 4 submarine chasers and 13 revenue cutters.

**Czecho-Slovakia.**—There are six patrol ships and two tugs on river service.

**Ecuador.**—The torpedo cruiser Libertador Bolivar, mine-laying torpedo boat Tarqui, and special vessel Cotopaxi.

**Egypt.**—Sloop (*ex* Syringa), 1918, 1310 tons, 17 knots, two 4-in. guns. Nile stern-wheel gunboats Sultan, Sheikh, and Melik, 140 tons, Zafir, Fateh and Naseh, 128 tons; also the Abu Klea, Hafir, Metemmeh, and Tamai.

**Esthonia.**—With small but efficient naval forces the young Navy of Esthonia gallantly assisted the operations of Sir Walter Cowan, whereby the independence of Esthonia was secured. Rear-Admiral Johan Pitka was in command, and in token of the happy association King George conferred upon that officer the K.C.M.G. The Navy consists of destroyers Wambola (*ex* Kapitan Kingsbergen), 1600 tons, 30 knots, four 4-in. guns, 2 M, 9 T.T., and Lennuk (*ex* Avtroil), 1800 tons, 32 knots, five 4-in. guns, and one 12-pr., 9 T.T., with gunboats, launches and some other vessels, including the *ex* Russian gunboat Bobr, 875 tons, two 4·7-in. and four 12-pr. guns, completed in 1908, which has received the name of Lembit. One mine-layer, three sweepers, five ice-breakers, and Peipus Lake gunboats Ahti and Tartu.

**Finland.**—The *ex* Russian gunboat Gilyak, 875 tons, two 4·7-in. and four 12-pr. guns; patrol boats Klas Horn (*ex* Posadnik), Matti Kurki (*ex* Voevoda), Karjala (*ex* Filin), and Turunmaa (*ex* Orlan); also 3 *ex* Russian torpedo boats, and a Holland type submarine of little value, three transports, 2 motor boats, 4 ice-breakers, and several mine-sweepers and layers.

**Hayti.**—Four special service vessels ranging from 270 tons to 1200 tons.

**Hungary.**—Patrol vessels: Debreczen, Kecskemet, Siofok, Szeged, and 4 others; also 10 motor launches.

**Jugo-Slavia.**—River monitors on the Danube: Drava (*ex* Enns), Morava (*ex* Körös), Sava (*ex* Bodrog), Varda (*ex* Bosnia). Two patrol vessels and 12 *ex* Austro-Hungarian torpedo boats (F. and T. classes) lightly armed, for police and preventive duties only; ten mine-sweepers, 16 seaplanes, and several transports.

**Latvia.**—Gunboat Virsaitis (*ex* German M 68).

**Mexico.**—Gun-vessels, Tampico and Vera Cruz (Elizabethport, New Jersey, 1902); displacement, 980 tons; armament, four 4-in. Q.F., six 6-pr.; 16 knots; fitted to serve as transports for 200 troops, Bravo 1200 tons; 2600 I.H.P.; 17 knots (Leghorn, 1904), and Aguas Prieta, 1200 tons; 1800 I.H.P.; 15 knots. Training ship Zaragoza, 1200 tons, 1300 H.P., 15 knots, four 4·7-in. and four small Q.F. Two revenue cutters. A small aircraft establishment. On the Pacific side, two gunboats and a transport.

**Peru.**—Almirante Grau and Coronel Bolognesi, cruisers, 3200 tons; (Barrow, 1906); two 6-in., eight 14-pdr., eight 1¼-pdr.; 2 submerged torpedo tubes; 24 knots; also Lima (training.) Gunboat America. Destroyer, Rodriguez, 500 tons, and submarines, Ferré and Palacios, built Le Creusot, 1912–13. Three submarines, Arica, Tacna, and Tarapacá, have been built in Italy (Ansaldo). Five river launches, two vedettes, and a small seaplane establishment.

**Poland.**—The Polish Government hopes eventually to become possessed of a small Navy. The British Naval Mission was withdrawn. It is proposed that Poland shall be allowed six small cruisers and gunboats on the Vistula. She has been allotted six *ex* German torpedo boats for police purposes. Gunboats, Komendant Pilsudski, 500 tons, carrying several small guns, and General Haller, built in Finland. Training ship, Lwow. Monitors, Warszowa, Horodyszcre, Pinsk, Mozyrz, and some 15 minor vessels. About 30 *ex* Italian flying-boats, and 5 *ex* German aeroplanes.

**Portugal.**—The most considerable vessel in the Portuguese Navy was the cruiser Almirante Reis, now dismantled, completed at Elswick in 1899; 4100 tons, 12,000 H.P.; four 5·9-in., eight 4·7-in., fifteen smaller guns, five tubes; 22 knots. The Adamastor, 1962 tons, completed at Leghorn in 1897, and the São Gabriel at Havre in 1899, have as their chief armament, two 5·9-in. and four 4·7-in. guns. Eleven gunboats mainly for Mozambique and Timor. The minelayer Vulcano was built by Messrs. Thornycroft in 1909. There are other small boats, and several sloops sold out of the British Navy are being added. These are the Republica (*ex* Gladiolus), and Carvalho Araujo (*ex* Jonquil.) Portugal has the old destroyer Tejo and three modern, Douro, Guadiana, and Vouga (1912–18), 700 tons, 11,000 H.P., 30 knots, two tubes, also four *ex* Austrian F boats for police duties. Submarines Espadarte, 245–300 tons, 13 knots (F.I.A.T.), and Foca, Golfinho, and Hidra (Laurenti); 260–389 tons, 13–8·5 knots, 2 T.T. Seaplane establishments at Belem, Faro and Aviero. The gunboat Patria is at Lourenço Marques.

**Roumania.**—The Black Sea Force comprises the flotilla leaders Marasti and Maracesti, and the torpedo boats Vijelia, Sborul, Naluca, Zmeul, Vartejul, and Viforul, four *ex* French gunboats fitted as mine-layers, and six *ex* Italian motor launches. At Constanza and Sulina are the old protected cruiser Elizabeta, now a hulk, the mine-layer Alexandru-cel-Bun (104 tons), and some tugs; and at Galatz the pilots' school, two river transports and some tugs. The Danube flotilla comprises the monitors Ioan Bratianu, Alexandru Lahovary, Lascar Catargiu, Mihail Kogalniceanu, Besarabia, Bucovina, and Ardeal (600 tons, three 4·7-in guns), seven vedettes, and the yacht Macinul. Seven *ex* Austrian F and T torpedo boats were assigned to Roumania for police duties.

**Russia.**—The only battleship recently in commission in the Baltic was the former Petropavlovsk (23,000 tons, twelve 12-in. guns) re-named Marat, which flew the flag of the former lieutenant who is in command, but the Pariskaya Kommuna (*ex* Sevastopol) is in the reserve. The principal forces are destroyers and submarines. The first-class destroyers are the Garibaldi (*ex* Ilyn), Kapt. Izulmetiev, Azard, Samson, Desna, Zabiaka, Pobyeditel, and Izyaslav, and there are the second-class boats Likhoi, Lovki, Krepki, Dmitriev, Zvyerev, Vnimatelni, Vnushitelni, Vuinoslavi, and Myetki. The submarines are the Leopard, Tur, Volk, Zmeya, Pantera, Ruis, Tigr, Yaguar, Yersh, Kuguar, and Vipr. The yacht Neva is the leading ship with the flotillas. Other formations are the mine-sweeping division, transport vessels (6), surveying vessels (7), depôt ships (4), and ice-breakers (8). Recently in reserve, with reduced complements, was the battleship Sevastopol, sister of the Petropavlovsk, now named Pariskaya-Kommuna, with one mine-layer, two divisions of mine-sweeping trawlers, a flotilla of second-class destroyers, two motor boats, and some other vessels. Out of commission and unfit for sea are the two other Dreadnoughts, Poltava and Gangut, an older battleship, and a number of older destroyers, torpedo boats, and submarines, mine-layers and sweepers, patrolling vessels and transports, none of them likely to be of any use. One or more of the big ships went to Hamburg to be broken up. Other vessels belong to the gunnery, torpedo, and mining schools. There were some manœuvres in September, 1922.

In the Arctic, where a former rear-admiral is in command, there is a destroyer division comprising the Kapitan Yurasovski, Leit. Sergyiev, Bezhumny, and Bestrashny, the last two in reserve. With the destroyers are the yacht Gorislava, a mine-layer, four motor launches, and some patrol and trawling vessels. In reserve, and probably useless, is the old battleship Chesma. The submarines Kommunist (formerly Sviatoi Georgi) and Delphin, six submarine chasers, and a number of armed auxiliaries, harbour craft, ice-breakers, and patrol boats constitute an active force.

Some progress has been made with naval aircraft, which are based on Oranienbaum, Guteff Island, and Peterhof near Petrograd, and List Nos, near the Finnish border. In all there were about 55 'planes, of which 28 were flying boats, but now the total number of 'planes is said not to exceed 14.

In the Black Sea no battleship is in commission. When Wrangel's forces evacuated Sevastopol on November 14, 1920, his fleet proceeded to Bizerta, where it is under French protection. Their future is uncertain. An account of the proceedings of Wrangel's fleet will be found in the "Annual," 1921–22, pp. 66 and 378. The ships in question are the Dreadnought General Alexeieff (*ex* Alexander III), the pre-Dreadnought Georgi Pobiedonosetz, two cruisers, General Korniloff and Almaz, 6 first-class and 3 second-class destroyers, 4 submarines and some auxiliaries.

The Soviet vessels in commission recently in the Black Sea were two divisions of destroyers, one of them (8 boats) fitted as mine-layers, comprising (1) the Bezposchadni, Bezstrashni, Bezumprechny, Bezshumny, Bravi, Bedovi, Buiny, Bodry; (2) Derzki, Delny, Jutki, Jarki, Jivoi, Jivuchi, Zorky, Zavidny, Prochny, Pronzitelny, Puilky, and Pruitky. There were also two other destroyers, three submarines A. G. 23 (Trotsky), A. G. 24 (Lunacharsky), and A. G. 25 (Kamenev), and mine-layers, armed vessels, patrol boats, repair ships, transports, etc. In reserve are 5 old battleships, of which all had their engines destroyed by explosion on April 25, 1919, and also a cruiser, 3 destroyers, 1 submarine, 6 submarine-chasing destroyers, large forces of mine-layers based on Odessa, and 6 mine-carriers, 7 patrol boats, 4 ice-breakers, and numbers of armed vessels and auxiliaries. Some additional submarines were sent overland from the Baltic. A small flotilla is on the Dnieper, comprising armed steamers, patrol boats and motor boats.

In the Caspian and on the Volga, with headquarters at Baku, is a force of 14 second-class destroyers, 2 smaller patrolling craft and colliers and other vessels. In reserve are the submarines Kassatka, Makrel, Minoga, and Okun, reported to be of no value, some submarine chasers, and mine-sweepers, motor launches and other vessels.

In the Far East, at Vladivostok, are some 12 of the older destroyers. On the Amur there remain only about 6 useful river gunboats out of a flotilla of 25.

The Bolshevik aircraft in the Black Sea and the Caspian are based on Sevastopol, Odessa, Nigolaieff, Taganrog, Mariupol, Eisk, Novorissisk, Zuzeli, and Baku, and number in all about 36, of which some 17 are said to be flying boats.

**Santo Domingo.**—The Independencia, built in England 1894, 322 tons, seven Hotchkiss Q.F. Four patrol vessels for revenue service.

**Sarawak.**—Gunboat Aline and steamboats Lorna Doone and Aden.

**Siam.**—The gunboats Bali and Sugrib, Muratha and Mongkut, 500–700 tons, one 4·7-in. Q.F., five 2·2-in., four 1·4-in., 11–12 knots, launched 1898, 1901, 1898, and 1887 respectively. Three despatch vessels, 100 to 250 tons. Two 380-ton, 27-knot destroyers, built at Kobe, Sua Gamron Sindhu and Sua Tayanchou. Phra Ruan (*ex* British destroyer Radiant, 1917). A coastal motor boat is being built in England. There is no definite organisation of the Siamese ships and vessels, which occasionally cruise from Bangkok.

**Turkey.**—By the Treaty of Sèvres, Turkey was reduced to naval impotence. The yachts Ertougrul and Sugutli and a motor launch were at the Sultan's disposal, and two gunboats were released by the Allies for patrol duties in the Black Sea. Under the Treaty of Lausanne, Turkey returns to her place among the Powers.

**Uruguay.**—Light cruiser Monte Video, torpedo-cruiser Uruguay, built at the Vulcan Yard, Stettin; 1400 tons; two 4·7-in., four 12-pdr., twelve Maxims; two 18-in. torpedo tubes. Torpedo boat Oriental, yacht 18 de Julio, and some special vessels.

**Venezuela.**—Marescal Sucre (*ex* Isla de Cuba), drill ship bought from United States, 1912. Gunboats, General Salom, Miranda, José Felix Pribas, Antonio Diaz.

# BRITISH AND FOREIGN FLOTILLAS.

## Great Britain.

### FLOTILLA LEADERS.

| Name or Number. | Built by. | Completed. | Dimensions. Length (extreme). | Dimensions. Beam. | Dimensions. Draught. | Number of Screws. | Displacement. | Horse-Power. | Mean Speed on Trial, or expected. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ft. ins. | ft. ins. | ft. ins. | | Tons. | | Knots. | | | | Tons. |
| Abdiel .. .. .. | Cammell Laird .. | 1916 | 325 | 31 9 | 10 9 mean, 12 0 max. | 3 | 1610 to 1680 | 36,000 | 34 | 4 4-in. Q.F.<br>1 2-pr.,<br>1 3-in. A.A.<br>(Abdiel 3 4-in. Minelayer.) | 4 | 130 to 140 | Oil. 515 |
| Grenville .. .. | „ „ .. | 1916 | | | | | | | | | | | |
| Seymour.. .. .. | | | | | | | | | | | | | |
| Saumarez .. .. | | | | | | | | | | | | | |
| Nimrod .. .. .. | Denny .. .. .. | 1915 | | | | | | | | | | | |
| Shakespeare .. .. | Thornycroft .. | 1917 | 329 | 31 11 | 12 4 | 2 | 1750 | 43,500 | 36·5 | 5 4·7-in.<br>1 3-in. A.A.<br>2 2-pr. A.A. | 6 | 182 | Oil. 500 |
| Spenser .. .. .. | „ .. | 1917 | | | | | | | | | | | |
| Wallace .. .. | „ .. | 1919 | | | | | | | | | | | |
| Keppel .. .. .. | „ .. | Bldg. | | | | | | | | | | | |
| Broke, *ex* Rooke .. | „ .. | Bldg. | | | | | | | | | | | |
| Bruce .. .. .. | Cammell Laird .. | 1918 | 332 6 | 31 9 | 12 3 | 2 | 1800 | 44,000 | 36·5 | 5 4·7-in.<br>1 3-in. A.A.<br>2 2-pr. A.A.<br>Campbell has no 2-pr. | 6 | 182 | Oil. 500 |
| Douglas .. .. .. | | | | | | | | | | | | | |
| Campbell .. .. | | | | | | | | | | | | | |
| Mackay, *ex* Claverhouse .. .. .. | | 1919 | | | | | | | | | | | |
| Malcolm.. .. .. | | 1919 | | | | | | | | | | | |
| Montrose .. .. | Hawthorn .. .. | 1918 | | | | | | | | | | | |
| Stuart .. .. .. | „ .. .. | 1918 | | | | | | | | | | | |

### TORPEDO BOAT DESTROYERS.

| Name or Number. | Built by. | Completed. | Dimensions. Length. | Dimensions. Beam. | Dimensions. Draught. | Number of Screws. | Displacement | Horse-Power. | Mean Speed on Trial, or expected. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Admiralty "S" Class:* | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| Sabre.. .. .. | Stephen .. .. | 1918 | 276 | 26¾ | 10⅝ | 2 | 1075 | 27,000 | 36 | 3 4-in., 1 2-pr., 1 M., 4 L. | 2 D. | 98 | 301 |
| Shamrock .. .. | Doxford .. .. | 1919 | | | | | | | | | | | |
| Saladin .. .. | Stephen .. .. | 1919 | | | | | | | | | | | |
| Sardonyx .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Tactician .. .. | Beardmore .. | 1918 | 276 | 26¾ | 10⅝ | 2 | 1075 | 27,000 | 36 | 3 4-in., 1 2-pr., 1 M., 4 L. | 2 D. | 98 | 301 |
| Tara .. .. .. | „ .. | 1918 | | | | | | | | | 2 D.<br>2 S. | | |
| Scimitar .. .. | Brown .. .. | 1918 | 276 | 26¾ | 10⅝ | 2 | 1075 | 27,000 | 36 | 3 4-in., 1 2-pr., 1 M., 4 L. | 2 D. | 98 | 301 |
| Scythe .. .. | „ .. .. | 1918 | | | | | | | | | | | |
| Seabear .. .. | „ .. .. | 1918 | | | | | | | | | | | |
| Seafire .. .. | „ .. .. | 1918 | | | | | | | | | | | |
| Searcher .. .. | „ .. .. | 1918 | | | | | | | | | | | |
| Seawolf .. .. | „ .. .. | 1918 | | | | | | | | | | | |
| Sepoy .. .. | Denny .. .. | 1918 | | | | | | | | | | | |
| Seraph .. .. | „ .. .. | 1918 | | | | | | | | | | | |
| Serapis .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Serene .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Sesame .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Sirdar .. .. | Fairfield .. .. | 1918 | | | | | | | | | | | |
| Somme .. .. | „ .. .. | 1918 | | | | | | | | | | | |
| Steadfast .. .. | Palmer .. .. | 1919 | | | | | | | | | | | |
| Sterling .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Spear.. .. .. | Fairfield .. . | 1918 | | | | | | | | | | | |
| Spindrift .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Turbulent .. .. | Haw. Leslie . | 1919 | | | | | | | | | | | |
| Tenedos .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Thanet .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Thracian .. .. | „ .. .. | 1922 | | | | | | | | | | | |
| Stormcloud .. .. | Palmer .. .. | 1920 | | | | | | | | | | | |
| Strenuous .. .. | Scott .. .. | 1919 | | | | | | | | | | | |
| Stronghold .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Sturdy .. .. | „ .. .. | 1919 | | | | | | | | | | | |
| Sportive .. .. | Swan Hunter .. | 1918 | | | | | | | | | | | |
| Sparrowhawk .. | „ „ | 1918 | | | | | | | | | | | |
| Splendid .. .. | „ „ | 1918 | | | | | | | | | | | |
| Simoom .. .. | Brown .. .. | 1918 | | | | | | | | | | | |
| Swallow .. .. | Scott .. .. | 1918 | | | | | | | | | | | |
| Tilbury .. .. | Swan Hunter .. | 1918 | | | | | | | | | | | |
| Tintagel .. .. | „ „ .. | 1918 | | | | | | | | | | | |

## Great Britain—*continued.*

| Name or Number. | Built by. | Completed. | Dimensions. Length. | Dimensions. Beam. | Dimensions. Draught. | Number of Screws. | Displacement. | Horse-Power. | Mean Speed on Trial, or expected. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESTROYERS—*Admiralty "S" Class—contd.* | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| Tomahawk (*Y*) | Yarrow | 1918 | 273½ | 25¾ | 9⅞ | 2 | 930 | 23,000 | 36 | 3 4-in., 1 2-pr., 1 M., 4 L. | 2 D. | 98 | 256 |
| Tumult (*Y*) | „ | 1918 | | | | | | | | | | | |
| Turquoise (*Y*) | „ | 1919 | | | | | | | | | | | |
| Tuscan (*Y*) | „ | 1919 | | | | | | | | | | | |
| Tyrian (*Y*) | „ | 1919 | | | | | | | | | | | |
| Tribune | J. S. White | 1918 | 276 | 26¾ | 10⅝ | 2 | 1075 | 27,000 | 36 | | | | |
| Trinidad | „ „ | 1918 | | | | | | | | | | | |
| Trojan | „ „ | 1918 | | | | | | | | | | | |
| Truant | „ „ | 1919 | | | | | | | | | | | |
| Trusty | „ „ | 1919 | | | | | | | | | | | |
| Torbay (*T*) | Thornycroft | 1919 | 275¾ | 27½ | 10½ | 2 | 1075 | 29,000 | 38 | | | | |
| Toreador (*T*) | „ | 1919 | | | | | | | | | | | |
| Tourmaline (*T*) | „ | 1919 | | | | | | | | | | | |
| Sikh | Fairfield | 1918 | 276 | 26¾ | 10⅝ | 2 | 1075 | 27,000 | 36 | 3 4-in., 1 2-pr., 1 M., 4 L. | 2 D. | 98 | 301 |
| Senator | Denny | 1918 | | | | | | | | | | | |
| Shark | Swan Hunter | 1918 | | | | | | | | | | | |
| Scout | Brown | 1918 | | | | | | | | | | | |
| Scotsman | „ | 1918 | | | | | | | | | | | |
| Torch (*Y*) | Yarrow | 1918 | 273½ | 25¾ | 9⅞ | 2 | 930 | 23,000 | 36 | 3 4-in., 1 2-pr., 1 M., 4 L. | 2 D. | 98 | 256 |
| Shikari | Doxford<br>Chatham | 1924 | 276¼ | 26¾ | 10⅝ | 2 | 1075 | 27,000 | 36 | 3 4-in., 1 2-pr., 1 M., 4 L. | 2 D. | 98 | 301 |
| *Admiralty "V" Class:* | | | | | | | | | | | | | |
| Vansittart | Beardmore | 1919 | 312 | 29½ | 10⅞ | 2 | 1325 | 27,000 | 34 | | | | 367 |
| Venomous | Brown | 1919 | | | | | | | | | | | 353 |
| Verity | „ | 1919 | | | | | | | | | | | 353 |
| Volunteer | Denny | 1919 | | | | | | | | | | | 370 |
| Veteran | Brown | 1919 | | | | | | | | 4 4·7 in., 2 2-pr., 1 M., 4 L. | 2 T. | 130 | 363 |
| Wanderer | Fairfield | 1919 | | | | | | | | | | | 367 |
| Wishart (*T*) | Thornycroft | 1920 | | | | | | | | | | | 374 |
| Wren | Yarrow | 1923 | 312 | 30¼ | 10·9 | 2 | 1350 | 30,000 | 35 | | | | 370 |
| Whitshed | Swan Hunter | 1919 | 312 | 29½ | 10⅝ | 2 | 1325 | 27,000 | 34 | | | | 368 |
| Wild Swan | „ „ | 1919 | | | | | | | | | | | 368 |
| Witherington | J. S. White | 1919 | | | | | | | | | | | 365 |
| Wivern | „ „ | 1919 | | | | | | | | | | | 365 |
| Wolverine | „ „ | 1920 | | | | | | | | | | | 365 |
| Worcester | „ „ | 1922 | | | | | | | | | | | 365 |
| Whitehall | Swan Hunter<br>Chatham | Bldg. | | | | | | | | | | | 365 |
| Witch | Thornycroft<br>Devonport | Bldg. | | | | | | | | | | | 365 |
| Walpole | Doxford | 1918 | 312 | 29½ | 10⅞ | 2 | 1300 | 27,000 | 34 | 4 4-in., 1 2-pr., 1 M., 4 L. | 2 T. | 120 | 367 |
| Whitley | „ | 1918 | | | | | | | | | | | |
| Waterhen | Palmer | 1918 | | | | | | | | | | | |
| Wryneck | „ | 1918 | | | | | | | | | | | |
| Windsor | Scott | 1918 | | | | | | | | 4 4-in., 1 3-in. A.A., 1 M., 4 L. | 2 T. | 120 | 367 |
| Wrestler | Swan Hunter | 1918 | | | | | | | | | | | |
| Woolston (*T*) | Thornycroft | 1918 | 312 | 30½ | 10⅞ | 2 | 1325 | 30,000 | 35 | 4 4-in., 1 2-pr., 1 M., 1 L. | 2 T. | 120 | 374 |
| Wolsey (*T*) | „ | 1918 | | | | | | | | | | | 374 |
| Wessex | Haw. Leslie | 1918 | 312 | 29½ | 10·7 | 2 | 1300 | 27,000 | 34 | | | | 369 |
| Winchester | J. S. White | 1918 | 312 | 29½ | 10·7 | 2 | 1300 | 27,000 | 34 | 4 4-in., 1 3-in. A.A., 1 M., 4 L. | 2 T. | 120 | 369 |
| Wolfhound | Fairfield | 1918 | 312 | 23½ | 10·7 | 2 | 1300 | 27,000 | 34 | 4 4-in., 1 2-pr., 1 M., 4 L. | 2 T. | 120 | 369 |
| Westminster | Scott | 1918 | 312 | 29½ | 10 7 | 2 | 1300 | 27,000 | 34 | 4 4-in., 1 3-in. A.A., 1 M., 4 L. | 2 T. | 120 | 367 |
| Westcott | Denny | 1918 | | | | | | | | | | | |
| Wakeful | Brown | 1917 | | | | | | | | 4 4-in., 1 2-pr., 1 M., 4 L. | 2 T. | 120 | 367 |
| Walker | Denny | 1918 | | | | | | | | | | | |
| Walrus | Fairfield | 1918 | | | | | | | | | | | |
| Warwick | Haw. Leslie | 1918 | | | | | | | | | | | |
| Watchman | Brown | 1918 | | | | | | | | | | | |
| Whirlwind | Swan Hunter | 1918 | | | | | | | | | | | |
| Winchelsea | J. S. White | 1918 | | | | | | | | | | | |
| Vanessa | Beardmore | 1918 | | | | | | | | | | | |
| Vanity | „ | 1918 | | | | | | | | | | | |
| Voyager | Stephen | 1918 | | | | | | | | | | | |
| Vidette | „ | 1918 | | | | | | | | 4 4-in., 1 3-in. A.A., 1 M., 4 L. | 2 T.<br>2 D. | 120 | 367 |
| Vivien | Yarrow | 1918 | | | | | | | | | | | |
| Valhalla | C. Laird | 1917 | | | | | | | | 4 4-in., 1 3-in. A.A., 1 M., 4 L. | 2 T. | | |
| Valentine | „ | 1917 | 312 | 29½ | 10⅜ | 2 | 1325 | 27,000 | 34 | 4 4in., 1 2-pr., 1 M., 4 L. | | 120 | 369 |
| Valkyrie | Denny | 1917 | | | | | | | | | | | |
| Valorous | „ | 1917 | | | | | | | | | 2 T. | | |
| Vampire | J. S. White | 1917 | .. | .. | .. | .. | .. | .. | .. | 4 4-in., 1 3-in. A.A., 1 M., 4 L. | 2 T. | | |

## Great Britain—*continued.*

| Name or Number. | Built by. | Completed. | Dimensions. | | | Number of Screws. | Displacement. | Horse-Power. | Mean Speed on Trial, or expected. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| DESTROYERS— | | | | | | | | | | | | | |
| *Admiralty "V" Class—contd.* | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| Vancouver .. | Beardmore .. | 1918 | .. | .. | .. | .. | .. | .. | .. | 4 4-in., 1 2-pr., 1 M., 4 L. | 1 T.,<br>1 D. | 120 | 369 |
| Vanoc .. | Brown .. | 1917 | .. | .. | .. | .. | .. | .. | .. | 4 4-in., 1 3-in. A A., 1 M., 4 L. | 2 D. | | |
| Vanquisher .. | ,, .. | 1917 | 312 | 29½ | 10·7 | 2 | 1300 | 27,000 | 34 | 4 4-in., 1 2-pr., 1 M., 4 L. | 2 T. | | |
| Vectis .. | J. S. White .. | 1917 | | | | | | | | | | | |
| Vega .. | Doxford .. | 1917 | | | | | | | | | | | |
| Velox .. | ,, .. | 1918 | | | | | | | | | 1 T., 1 D | | |
| Vendetta .. | Fairfield .. | 1917 | | | | | | | | | 2 T. | | |
| Venetia .. | ,, .. | 1917 | | | | | | | | | | | |
| Venturous .. | Denny .. .. | 1917 | .. | .. | .. | .. | .. | .. | .. | .. .. .. | 2 T. | | |
| Verdun .. | Haw. Leslie .. | 1917 | .. | .. | .. | .. | .. | .. | .. | 4 4-in., 1 3-in A.A. | 2 D. | | |
| Versatile .. | ,, .. | 1918 | | | | | | | | 4 4-in., 1 2-pr. | 1 T., 1 D. | | |
| Vesper .. | Stephen .. | 1918 | | | | | | | | 4 4-in., 1 3-in. | 2 T. | | |
| Viceroy (*T*) .. | Thornycroft .. | 1918 | 312 | 30½ | 10¾ | 2 | 1325 | 30,000 | 35 | 4 4-in., 1 2-pr., 1 M., 4 L. | 2 T. | | |
| Viscount (*T*) .. | ,, .. | 1918 | | | | | | | | | 2 T. | | |
| Vimiera .. | Swan Hunter .. | 1917 | 312 | 29½ | 10⅝ | 2 | 1300 | 27,000 | 34 | | 2 T. | | |
| Violent .. | ,, ,, ... | 1917 | 312 | 29½ | 10¾ | 2 | 1300 | 27,000 | 34 | | 2 T. | | |
| Vivacious .. | Yarrow .. | 1917 | | | | | | | | | 2 T. | | |
| Vortigern .. | J. S. White .. | 1918 | | | | | | | | | 2 T.<br>1 D. | | |
| *Admiralty "R" Class;* | | | | | | | | | | | | | |
| Tancred .. | Beardmore .. | 1917 | 276 | 26¾ | 10⅝ | 2 | 1065 | 27,000 | 36 | 3 4-in., 1 2-pr., 1 M., 4 L. | 2 D. | 98 | 296 |
| Tarpon .. | Brown .. .. | 1917 | | | | | | | | | 2 D. | | |
| Telemachus .. | ,, .. .. | 1917 | | | | | | | | | 1 D. | | |
| Tempest .. | Fairfield .. | 1917 | 275½ | 26⅝ | 10¾ | 2 | 1065 | 27,000 | 36 | 3 4-in., 2 3-pr., 1 2-pr., 1M., 4 L. | 2 D. | 98 | 296½ |
| Tenacious .. | H. & Wolff .. | 1917 | 275¾ | 26⅝ | 10⅝ | 2 | 1065 | 27,000 | 36 | | | | |
| Tetrarch .. | ,, .. | 1917 | 275¾ | 26¾ | 10⅝ | 2 | 1065 | 27,000 | 36 | | | | |
| Thisbe .. | Haw. Leslie .. | 1917 | 275½ | 26¾ | 10⅝ | 2 | 1065 | 27,000 | 36 | 3 4-in., 1 2-pr., 1 M., 4 L. | 2 D. | 98 | 300<br>(*Y*) 256<br>(*T*) 285 |
| Thruster .. | ,, .. | 1917 | | | | | | | | | | | |
| Tormentor .. | Stephen .. | 1917 | 276¼ | 26¾ | 10⅝ | | | | | | | | |
| Torrid .. | Swan Hunter .. | 1917 | 275¾ | 26¾ | 10¾ | | | | | | | | |
| Truculent (*Y*) .. | Yarrow .. | 1917 | 271½ | 25¾ | 9½ | 2 | 900 | 23,000 | 36 | | | | |
| Tyrant (*Y*) .. | ,, .. | 1917 | | | | | | | | | | | |
| Taurus (*T*) .. | Thornycroft .. | 1917 | 276¼ | 27 | 10½ | 2 | 1065 | 29,000 | 35 | | | | |
| Teazer (*T*) .. | ,, .. | 1917 | | | | | | | | | | | |
| Satyr .. | Beardmore .. | 1917 | 275½ | 26⅝ | 10⅝ | 2 | 1065 | 27,000 | 36 | | | | |
| Sharpshooter .. | ,, .. | 1917 | | | | | | | | | | | |
| Skate .. | Brown .. .. | 1917 | 276 | 26¾ | 10⅝ | | | | | | | | |
| Skilful .. | H. & Wolff .. | 1917 | 275⅝ | 26½ | 10⅝ | | | | | | | | |
| Springbok .. | ,, .. | 1917 | 275¾ | 26⅝ | 10⅝ | | | | | | | | |
| Starfish .. | Haw. Leslie . | 1916 | 275½ | 26¾ | 10⅝ | | | | | | | | |
| Stork .. | ,, .. | 1917 | | | | | | | | | | | |
| Romola .. | Brown .. .. | 1916 | | | | | | | | | | | |
| Rowena .. | ,, .. .. | 1916 | | | | | | | | | | | |
| Restless .. | ,, .. .. | 1916 | | | | | | | | | | | |
| Rigorous .. | ,, .. .. | 1916 | | | | | | | | | | | |
| Rocket .. | Denny .. .. | 1916 | 276 | 26¾ | 10⅝ | | | | | | | | |
| Rob Roy .. | ,, .. .. | 1916 | | | | | | | | | | | |
| Redgauntlet .. | ,, .. .. | 1917 | | | | | | | | | | | |
| Rosalind (*T*) .. | Thornycroft .. | 1916 | 274 | 27⅓ | 10⅓ | 2 | 1035 | 29,000 | 35 | | | | |
| Retriever (*T*) .. | ,, .. | 1917 | | | | | | | | | | | |
| Redoubt .. | Doxford .. | 1917 | 274 | 26¾ | 10⅝ | 2 | 1065 | 27,000 | 36 | | | | |
| Sturgeon .. | Stephen .. | 1917 | 276 | 26¾ | 10¾ | | | | | | | | |
| Sceptre .. | ,, .. | 1917 | 276½ | 26¾ | 10⅝ | | | | | | | | |
| Salmon .. | H. & Wolff .. | 1916 | 275¾ | 26¾ | 10⅝ | | | | | | | | |
| Sylph .. | ,, .. | 1917 | | | | | | | | | | | |
| Sarpedon .. | Haw. Leslie ... | 1916 | 275½ | 26¾ | 10⅝ | | | | | | | | |
| Sable .. | J. S. White .. | 1916 | 275¾ | 26¾ | 10⅝ | | | | | | | | |
| Sorceress .. | Swan Hunter .. | 1916 | 276 | 26¾ | 10⅝ | | | | | | | | |
| Radstock .. | ,, .. | 1916 | 275¾ | 26¾ | 10⅝ | | | | | | | | |
| Raider .. | ,, .. | 1916 | | | | | | | | | | | |
| Sabrina (*Y*) .. | Yarrow .. | 1916 | 271½ | 25¾ | 9½ | 2 | 900 | 23,000 | 36 | | | | |
| Sybille (*Y*) .. | ,, .. .. | 1916 | 269½ | 25¾ | 9½ | | | | | | | | |
| Rapid (*T*) .. | Thornycroft .. | 1916 | 274¼ | 27⅓ | 10 | 2 | 1035 | 27,500 | 35 | | | | |
| Ready (*T*) .. | ,, .. | 1916 | | | | | | | | | | | |
| Relentless (*Y*) .. | Yarrow .. | 1916 | 271½ | 25¾ | 9½ | 2 | 900 | 23,000 | 36 | | | | |
| Rival (*Y*) .. | ,, .. | 1916 | | | | | | | | | | | |

## Great Britain—*continued.*

| Name. | Built by. | Completed. | Dimensions. Length. | Dimensions. Beam. | Dimensions. Draught. | Number of Screws. | Displacement. | Horse-Power. | Mean Speed on Trial, or expected. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Feet. | Feet. | Feet. | | Tons. | | | | | | Tons. |
| DESTROYERS—<br>*Admiralty Modified "R" Class:* | | | | | | | | | | | | | |
| Ulster | Beardmore | 1917 | 276 | 26¾ | 10⅜ | 2 | 1085 | 27,000 | 36 | 3 4-in.,<br>1 2-pr.,<br>1 M., 4 L. | 2 D. | 98 | 300 |
| Umpire | Doxford | 1917 | | | | | | | | | | | |
| Undine | Fairfield | 1917 | | | | | | | | | | | |
| Urchin | Palmer | 1917 | | | | | | | | | | | |
| Ursa | ,, | 1917 | | | | | | | | | | | |
| Ursula | Scott | 1917 | | | | | | | | | | | |
| Tower | Swan Hunter | 1917 | | | | | | | | | | | |
| Trenchant | J. S. White | 1917 | | | | | | | | | | | |

NOTE.—Two new destroyers, Amazon and Ambuscade, are being laid down in 1924.

### SLOOPS.

Of the large number of sloops built during the war for patrol and other duties, only thirty-two now remain in the Post-War Fleet—some in commission abroad and others for subsidiary and training duties in home waters.

Names are as follow: Harebell, Windflower, Chrysanthemum, Bryony, Sweetbriar, Heather—1290 tons; length, 276 ft.; H.P. 2500; speed, 16½ knots; armament, two 4-in., two 12-prs. (Heather has one 4-in., one 12-pr., and one 3-pr. A.A.).

Cornflower, Crocus, Cyclamen, Delphinium, Godetia, Lupin, Rosemary, Snapdragon, Valerian, Verbena, Wallflower, Wistaria—1250 tons; length, 267¾ ft.; H.P., 2000; speed, 16½ knots; armament, two 4-in., four 3 pr. A.A.

Clematis, Heliotrope, Daffodil, Bluebell, Magnolia, Laburnum, Veronica, Vulcan II. (*late* Lily), Dahlia, Foxglove, Hollyhock—1200 tons; length, 262½ ft: H.P. 1800; speed, 16½ knots; armament, two 4-in., four 3-prs., one or two 2-prs.

Ladas, Silvio, and Sir Hugo—1320 tons; length, 276½ ft.; H.P., 2500; speed, 17 knots.

### TWIN-SCREW MINE-SWEEPERS.

The following are retained in the Post-War Fleet:—

Aberdare, Abingdon, Alresford, Albury, Dryad, Caterham, Fareham, Sherborne, Mistley, Burslem, Truro, Badminton, Bagshot, Tring, Leamington, Dorking, Dundalk, Dunoon, Elgin, Faversham, Fermoy, Ford, Forres, Gainsborough, Gretna, Harrow, Holderness, Huntley, Kendal, Lydd, Mallaig, Malvern, Marazion, Marlow, Nailsea, Newark, Northolt, Pangbourne, Ross, Rugby, Saltash, Saltburn, Selkirk, Shrewsbury, Southdown, Stafford, Stoke, Sutton, Tedworth, Tiverton, Tonbridge, Tralee, Wetherby, Weybourne, Widnes, Yeovil—800 tons; length, 231 feet; H.P., 2200; speed, 16 knots; armament, one 4-in., one 12-pr.

Most of the foregoing form a "Central Reserve of Twin-Screw Mine-sweepers." In addition, the following are employed on surveying duties:—

Beaufort, Fitzroy, Flinders, Kellet.

Displacement, 800 tons; length, 231 ft.; H.P., 2200; speed, 16 knots; armament, one 3-pdr.; 140 tons of coal; complement, 74.

Other surveying ships, of new types, are the Herald (*ex*-Merry Hampton), the Ormonde, and the Iroquois; and of old types, the Endeavour, Fantome, and Mutine. The two last-named are to be disposed of on relief by the Herald and Ormonde respectively.

### PATROL BOATS.

The following are retained in the Post-War Fleet:—

P 31, P 38, P 40, P 59, PC 73, PC 74.

P's displacement, 613 tons; length, 244½ ft.; H.P., 3500; speed, 20 knots; armament, one 4-in., one 2-pdr.; oil, 93 tons; complement, 54.

PC's displacement, 694 tons; length, 247 ft.

### SUBMARINES.

"*H*" *Class:*—H 21, H 22, H 23, H 24, H 25, H 26, H 27, H 28, H 29, H 30, H 31, H 32, H 33, H 34, H 43, H 44, H 47, H 48, H 49, H 50, H 52.

Surface displacement, 440 tons, submerged, 500; surface H.P., 480, submerged, 320; surface speed, 13 knots, submerged, 10½ knots; oil, 16 tons; armament, four 21-in. tubes; complement, 23.

"*K*" *Class:*—K 2, K 6, K 12, K 14, K 22, K 26.

Surface displacement, 1880 tons, submerged, 2560; surface H.P., 10,000, submerged, 1400; surface speed, 24 knots, submerged, 9½ knots; oil, 200 tons; armament,* two 4-in., eight 18-in. tubes; surface propulsion by steam turbines; complement, 57.

"*L*" *Class:*—L 1, L 2, L 3, L 4, L 5, L 6, L 7, L 8, L 9, L 11, L 12, L 14, L 15, L 16, L 17, L 18, L 19, L 20, L 21, L 22, L 25, L 33, L 52, L 56, L 69, L 71. Building, L 23, L 26, L 27, L 53, L 54.

Surface displacement, 890 tons, submerged, 1080; surface H.P., 2400, submerged, 1600; surface speed, 17½ knots, submerged, 10½ knots; oil, 76 tons; armament, one 4-in., six 18-in. tubes (L 52 and later boats have two 4-in. guns each); complement, 39.

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* K 26 has three 4-in. guns and ten torpedo tubes. K 14 has one 4-in. and one 3-in.

"*M*" *Class*:—M 1, M 2, M 3 (*ex*-K 18, K 19, and K 20). Surface displacement, 1600 tons, submerged, 1950; surface H.P., 2400, submerged, 1600; surface speed, 15¼ knots, submerged, 9¼ knots; oil, 76 tons; armament, one 12-in., one 3-in., one M., four tubes, complement, 68.

"*R*" *Class*:—R 4, R 10.

Surface displacement, 420 tons, submerged, 500; surface H.P., 240, submerged 1200; surface speed, 9½ knots, submerged, 15 knots; oil, 13 tons; complement, 23.

"*X*" *Class*:—X 1; surface displacement, 2780 tons, submerged, 3600 tons. Building at Chatham. Other particulars uncertain.

"*O*" *Class*:—O 1; surface displacement, 1480 tons, submerged, 1750 tons. Building at Chatham. Other particulars uncertain.

## Argentine Republic.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| DESTROYERS— | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| Catamarca .. .. | Schichau .. | 1911 | 288·7 | 27 | 8·6 | 2 | 950 | 18,000 | 32 | 3 4-in. | 4 | 100 | 360 |
| Jujuy .. .. | Germania .. | | | | | | | | | | | | |
| Cordoba .. .. | Shichau .. | 1910 | 295 | 29·5 | 7·8 | .. | 950 | 20,000 | 34·7 | 3 4-in. | 4 | 100 | 340 |
| La Plata .. .. | Germania .. | 1911 | | | | | | | | | | | |
| TORPEDO BOATS— | | | | | | | | | | | | | |
| Corrientes .. .. | Yarrow .. | 1896 | 190 | 19 5 | 8·2 | 2 | 340 | 4,000 | 27·4 *t.* | 1 14-pr., 3 6-prs., and 2 1-pr. | 3 | 66 | 80 |
| Missiones .. .. | Yarrow .. | 1896 | | | | | | | 26·0 *t.* | | | | |
| Entre Rios .. .. | Yarrow .. | 1896 | | | | | | | 26·7 *t.* | | | | |
| Comodoro Py .. | Thornycroft | 1890 | 150 | 14·5 | 3·5 | .. | 110 | 1,700 | 24·5 | 2 3-pr, 1 M. | 3 | 43 | 24 |
| Murature .. .. | ,, | | | | | | | | | | | | |
| Buchardo .. . | Yarrow .. | 1890 | 130 | 14 | 6 | .. | 85 | 1,200 | 23 | 2 3-pr., 1-M. | 3 | 28 | 22 |
| Jorge .. .. | | | | | | | | | | | | | |
| Thorne .. .. | | | | | | | | | | | | | |

## Brazil.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| DESTROYERS— | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| Para .. .. .. .. | Yarrow .. | 1908 | 240 | 23·6 | 10 | 2 | 560 | 7,014 | 27·25 | 2 4-in., 4 3 prs. | 2 | .. | 140 |
| Amazonas .. .. | | 1908 | | | | | | 6,898 | 27·17 | | | | |
| Piahuy .. .. .. | | 1908 | | | | | | 6,563 | 27·21 | | | | |
| Matto Grosso .. .. | | 1908 | | | | | | 7,403 | 27·16 | | | | |
| Parahyba .. .. .. | | 1909 | | | | | | 6,700 | 27·29 | | | | |
| Rio Grande do N. .. | | 1909 | | | | | | 7,778 | 27·27 | | | | |
| Alagoas .. .. .. | | 1909 | | | | | | 7,403 | 27·25 | | | | |
| Santa Catharina .. | | 1909 | | | | | | 6,982 | 27·30 | | | | |
| Parana .. .. .. | | 1910 | | | | | | 8,877 | 28·74 | | | | |
| Sergipe .. .. .. | | 1909 | | | | | | 8,554 | 27·60 | | | | |
| Almirante Alexandrino de Alencaa | Thornycroft .. | 1913 | 265·3 | 26·5 | 10·2 | .. | 934 | 22,500 | 31 | 3 4-in.,<br>1 2-pr. | 2 | .. | 250 |
| TORPEDO BOATS— | | | | | | | | | | | | | |
| Goyaz .. .. .. | Yarrow .. | 1907 | 152·5 | 15·3 | .. | 3 | .. | .. | 26·5 | 2-3 prs. | 2 | .. | .. |
| SUBMARINES— | | | | | | | | | | | | | |
| F 1, 3, 5 .. .. .. | Muggiano (Fiat) | 1914 | 150 | 14 | 9·8 | .. | 250–375 | .. | 14–8·5 | .. | 2 | .. | .. |

Six *ex* German torpedo-boats were allotted to Brazil, to be used for police purposes. A Laurenti submarine salvage and testing vessel, named Ceará, 3800 tons, 328 ft. long, 59 ft. beam, 14 knots.

## Chile.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| DESTROYERS— | | | | | | | | | | | | | |
| Almirante Lynch, Condell.. .. .. | White.. .. | 1912<br>1913 | 320 | 32·6 | 11·1 | 3 | 1850 | 30,000 | 31·7 | 6–4-in. 2 M. | 4 | 160 | 507 |
| Almirante Riveros (*ex*-Broke) .. | White .. | 1914 | 320 | 32·6 | 11 | 3 | 1700 to 1740 | 30,000 | 31·5 | 2–4·7-in., 2–4-in. | 4 | 160 | 486 |
| Almirante Uribe (*ex*-Faulknor) .. | | | | | | | | | | | | | |
| Almirante Williams (*ex*-Botha) .. .. | | | | | | | | | | | | | |
| Capitan Orella .. | Laird .. .. | 1896 | 210 | 21·5 | 5·4 | 2 | 300 | 6,000 | 30·17 | 1-12 pr. Q.F.<br>5-6 pr. | 2 | 65 | 90 |
| Capitan Muñoz Gamero.. .. .. | Laird .. .. | 1896 | 210 | 21·5 | 5·4 | 2 | 300 | 6,000 | 30·42 | 1–12 pr. Q.F.<br>5-6 pr. | 2 | 65 | 90 |
| Teniente Serrano .. | Laird .. .. | 1896 | 210 | 21·5 | 5·4 | 2 | 300 | 6,000 | 30·35 | 1–12 pr. Q.F.<br>5-6 pr. | 2 | 65 | 90 |
| Guardia-Marina Riquelme .. .. | Laird .. .. | 1896 | 210 | 21·5 | 5·4 | 2 | 300 | 6,000 | 30·09 | 1-12 pr. Q.F.<br>5-6 pr. | 2 | 65 | 90 |
| Capitan Merino Jarpa .. .. .. | Laird .. .. | 1901 | 210 | 21·5 | 5·4 | 2 | 350 | 6,000 | 30 | Do. | 2 | 65 | 90 |
| Capitan O'Brien .. | | | | | | | | | | | | | |
| Captain Thompson.. | Armstrong . | 1902 | 210 | 21·5 | 5·5 | 2 | 350 | 6,500 | 28 | 6–6 pr. | 2 | 65 | 120 |

Six submarines (Holland type) built for the British Government in 1915 were ceded to the Chilian Navy in 1917. They are numbered H 1 to H 6; 360-470 tons, 480-320 H.P., 11-5 knots, length 150 feet, 4 T.T.

## Denmark.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| TORPEDO BOATS. | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| FIRST CLASS— | | | | | | | | | | | | | |
| Havkatten, Sælen .. | Royal Dockyard, Copenhagen | 1919 | 126·3 | 13·9 | 9 | 2 | 108·5 | 2,000 | 24·6 | 2 6-pr. A.A. | 2 | 22 | 15 |
| Nordkaperen .. .. | | 1918 | | | | | | | | | | | |
| Makrelen .. .. .. | | 1918 | | | | | | | | | | | |
| Narhvalen .. .. | | 1917 | | | | | | | | | | | |
| Havhesten, Söhunden | | 1917 | | | | | | | | | | | |
| Söløven, Stören .. | | 1916 | | | | | | | | | | | |
| Springeren .. .. | | 1916 | | | | | | | | | | | |
| Ormen .. .. .. | | 1907 | 124·6 | 14·3 | 8·5 | 1 | 105 | 2,100 | 26 | 2 1-pr. | 3 | 21 | 11 |
| Sværdfisken .. .. | | 1913 | 148·2 | 16·9 | 7·5 | 2 | 190 | 3,480 | 26·2 | 1 6-pr. | 4 | 30 | 28 |
| Delfinen, Hvalrossen | | 1913 | | | | | | | | | | | |
| Söulven .. .. .. | Burmeister, Copenhagen | 1911 | 181·7 | 18 | 9·7 | 2 | 275 | 5,000 | 27·5 | 2 12-pr. | 5 | 33 | 55 |
| Flyvefisken .. .. | | 1911 | | | | | | | | | | | |
| Söridderen .. .. | Yarrow & Co. | 1911 | | | | | | | | | | | |
| Spaekhuggeren .. | Royal Dock., Copenhagen | 1911 | 184·8 | 19·1 | 7·1 | 2 | 300 | 5,000 | 27·5 | 2 12-pr. | 5 | 34 | 49 |
| Vindhunden .. .. | | | | | | | | | | | | | |
| Tumleren.. .. .. | Schichau | | | | | | | | | | | | |

SUBMARINES—Bellona, Flora, Rota, 301–369 tons, 1 2·2-in. A.A., 4 T.T. Galathea, Neptun, Triton, Ran, Ægir, 185-235 tons, 13·5 9·8 kts., 1 2·2-in. A.A., 3 T.T. Nymfen, Najaden, Havfruen, Havmanden, Thetis, Anden 2 April, 167–204 tons, 13·5 8 kts., 2 M., 2 T.T. Two building.

## France.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons |
| **FLOTILLA LEADERS—** | | | | | | | | | | | | | |
| Chacal .. .. .. .. | St. Nazaire.. | Bldg. | 393 | 36 | .. | .. | 2,360 | 50,000 | 35·5 | 6 5-in., 2 2 9-in. A.A., 21·7-in., torpedoes. | 6 | — | 540 |
| Jaguar .. .. .. .. | Lorient Dy. | 1923 | | | | | | | | | | | |
| Leopard .. .. .. .. | St. Nazaire.. | Bldg. | | | | | | | | | | | |
| Lynx .. .. .. .. .. | „ | „ | | | | | | | | | | | |
| Panthère .. .. .. .. | Lorient Dy. | „ | | | | | | | | | | | |
| Tigre .. .. .. .. .. | Nantes .. | 1924 | | | | | | | | | | | |
| Amiral Sénès, *ex* S. 113 | Germany .. | 1918 | 360 | 36 | 14·8 | 2 | 2,380 | 56,000 | 36·9 | 4 5·9-in., 4 M. | 4 dbl. | 180 | 700 |
| **DESTROYERS—** | | | | | | | | | | | | | |
| Bourrasque .. .. .. | Dunkerque | Bldg. | | | | | | | | | | | |
| Cyclone .. .. .. .. | Havre .. | „ | 326 | 31·7 | .. | .. | 1,430 | 30,000 | 33·5 | 4 5·1-in., 1 2·9-in. A.A., 21·7-in., torpedo tubes. | 6 | 140 | 350 |
| Mistral .. .. .. .. | | | | | | | | | | | | | |
| Orage .. .. .. .. .. | Caen .. .. | „ | | | | | | | | | | | |
| Ouragon .. .. .. .. | | | | | | | | | | | | | |
| Simoun .. .. .. .. | St. Nazaire.. | 1924 | | | | | | | | | | | |
| Sirocco .. .. .. .. | | Bldg. | | | | | | | | | | | |
| Tempête .. .. .. .. | Nantes .. | „ | | | | | | | | | | | |
| Tramontane .. .. .. | Bordeaux .. | „ | | | | | | | | | | | |
| Trombe .. .. .. .. | | | | | | | | | | | | | |
| Typhon .. .. .. .. | Harfleur .. | „ | | | | | | | | | | | |
| Tornade .. .. .. .. | Bordeaux .. | „ | | | | | | | | | | | |
| Bouclier .. .. .. .. | Normand .. | 1911 | 237·0 | 24·9 | 9·4 | 3 | 790 | 13,000 | 35·33 | 2 3·9-in. 4 9-pr. | 4 | 70 | 140 |
| Carquois .. .. .. .. | Rochefort .. | 1906 | 197·4 | 21·5 | 11·5 | 2 | 350 | 6,400 | 28 | 1 9-pr. 6 3-prs. | 2 | 70 | 80 |
| Casque .. .. .. .. | Havre (F.&C.) | 1910 | 246·4 | 25 | 10·0 | 3 | 820 | 14,400 | 34·90 | 2 3·9-in. 4 9-pr. | 4 | 70 | 160 |
| Cavalier .. .. .. .. | Normand .. | 1910 | 222·0 | 21·8 | 10·5 | 3 | 527 | 8,600 | 31·19 | 6 9-prs. | 2 | 70 | 110 |
| Cimeterre .. .. .. .. | Bordeaux .. | 1911 | 213·4 | 26 | 10·0 | 2 | 894 | 13,500 | 31·15 | 2 3·9-in. 4 9-pr | 4 | 70 | 140 |
| Fanfare .. .. .. .. | Normand .. | 1907 | 196·8 | 21·7 | 11·5 | 2 | 350 | 6,400 | 28 | 1 9-pr. 6 3-prs. | 2 | 70 | 80 |
| Glaive.. .. .. .. .. | Rochefort .. | 1908 | 197·4 | 22·4 | 11·2 | 2 | 358 | 6,800 | 27·90 | 1 9-pr. 6 3-prs. | 2 | 70 | 80 |
| Lansquenet .. .. .. | Bordeaux .. | 1909 | 221·0 | 20·8 | 10·0 | 3 | 542 | 8,129 | 28·8 | 6 9-prs. | 3 | 71 | 100 |
| Mameluck .. .. .. .. | Nantes .. | 1909 | 216 | 22·8 | 10·0 | 2 | 407 | 7,750 | 30·5 | 6 9-prs. | 3 | 71 | 100 |
| Massue .. .. .. .. | Toulon .. | 1908 | 197·4 | 21·7 | 11·4 | 2 | 350 | 6,800 | 28·4 | 1 9-pr. 6 3-prs. | 2 | 70 | 80 |
| Mortier .. .. .. .. | Rochefort .. | 1906 | 197·4 | 21·5 | 11·5 | 2 | 350 | 6,400 | 28 | 1 9-pr. 6 3-prs. | 2 | 70 | 80 |
| Poignard .. .. .. .. | Rochefort .. | 1909 | 197 | 22 | 11·5 | 2 | 358 | 6,800 | 28 | 1 9-pr. 6 3-prs. | 2 | 70 | 80 |
| Sape .. .. .. .. .. | S. de S. Nazaire | 1907 | 197·4 | 21·5 | 11·5 | 2 | 350 | 6,400 | 28 | 1 9-pr. 6 3-prs | 2 | 70 | 80 |
| Spahi .. .. .. .. .. | Havre.. .. | 1908 | 224 | 21·7 | 10 | 2 | 455 | 9,000 | 29·4 | 6 9-prs. | 3 | 71 | 100 |
| Trident .. .. .. .. | Rochefort .. | 1907 | 197·4 | 21·5 | 11 5 | 2 | 350 | 6,400 | 28 | 1 9-pr. 6 3-prs. | 2 | 70 | 80 |
| Com. Bory, Francis Garnier, Com. Rivière, Capt. Mehl, Deborter (5) .. | Normand, &c. .. .. | 1912 | 253·6 | 25·4 | 10·0 | 3 | 780 | 14,100 | 31 | 2 3·9-in., 4 9-prs. | 4 | 81 | 140 |
| Bisson .. .. .. .. Protet, Magon, Comm. Lucas, Mangini (4) .. | Toulon, etc. | 1912 & 1913 | 272·4 | 26 | 10·0 | 3 | 800–850 | 15,000 | 31 | 2 3·9-in., 4 9-prs. | 2 dbl. | 84 | 140 |
| Enseigne Henry, Aspirant Herbert (2) .. .. | Rochefort .. | 1911 & 1912 | 221 | 21·6 | 10·3 | 2 | 475 | 7,500 | 28·5 | 6 9-prs. | 3 | 70 | 100 |
| Ens. Poux, M. P. Lestin | Rochefort .. | 1915–1920 | 271 | 28 | 10·0 | 2 | 880 | 17,000 | 31 | 2 3·9-in., 4 9 prs. | 3 dbl. | 81 | 200 |
| Ens. Gabolde .. .. .. | Havre .. .. | 1921 | 271 | 26·9 | 10·0 | 2 | 900 | 20,000 | 32·5 | 3 3 9-in. 1 14-pr. | 4 | .. | 200 |
| Buino, *ex* V. 130 .. .. | Germany .. | 1917 | 269 | 28 | 10·0 | 2 | 1,150 | 25,000 | 34·7 | 3 4-in., 2 M., 24 mines. | 6 | .. | 300 |
| Rageot de la Touche, *ex* H. 146 | Germany .. | 1917 | 279·8 | 27·4 | 10·0 | 2 | 1,110 | 23,800 | 33·3 | 3 4-in., 4 M., 40 mines. | 6 | .. | 330 |
| Delage, *ex* H. 147 .. .. | Germany .. | | | | | | | | | | | | |
| Deligny, *ex* S. 139 .. .. | Germany .. | 1917 | 272·3 | 27·3 | 10·0 | 2 | 1,030 | 24,000 | 33·7 | 3 4-in., 4 M. | 6 | .. | 300 |
| Chastang, *ex* S. 133 .. .. | Germany .. | | | | | | | | | | | | |
| Vesco, *ex* S. 134 .. .. | Germany .. | | | | | | | | | | | | |
| Mazaret, *ex* S 135 .. .. | Germany .. | | | | | | | | | | | | |
| P. Durand, *ex* V. 79 .. | Germany .. | 1915 | 269 | 28 | 10·0 | 2 | 1,170 | 23,000 | 30·2 | 3 4·1-in., 4 M., 24 mines. | 6 | .. | 300 |
| Matelot Leblanc, *ex* Dukla | Fiume .. | 1916 | 277 | 25·7 | 10·0 | 2 | 836 | 17,000 | 32·5 | 2 3·9-in., 6 smaller. | 4 | 102 | .. |
| Téméraire, Intrépide, Opiniâtre, Aventurier | Nantes .. | 1911 | 290 | 28·5 | 9·0 | .. | 950–1200 | 18,000 | 32 | 4 3·9-in. 2 3-prs. A.A. | 4 | 102 | 330 |
| Annamite, Algérien, Arabe, Bambara, Hova Kabyle, Marocain, Sakalave, Sénégalais, Somali, Tonkinois, Touareg .. | Japan .. .. | 1917 | 272 | 24 | 10·0 | .. | 685–830 | 10,000 | 30 | 1 4·7-in., 4 12-prs. | 2 dbl. | 87 | 220 |

## France—*continued.*

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. Surf-sub. | Indicated Horse-Power. | Maximum Trial Speed. Surf-sub. | Armament. | Torpedo Tubes. | Complement. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | |
| | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | |
| SUBMARINES— | | | | | | | | | | | | |
| Requin<br>Morse<br>Narval<br>Souffleur<br>Caiman<br>Dauphin<br>Espadon<br>Marsouin<br>Phoque | Cherbourg<br>Toulon<br>Brest | 1924<br>Bldg. | 256·5 | 21·5 | 15 | 2 | 1130-1410 | 2900-<br>1800 | 16-10 | 1 3·9-in. | 10 | .. |
| Ariane<br>Ondine<br>Danaé<br>Eurydice | Havre | Bldg. | 216·5 | 16 | 11·5 | 2 | 600-765 | 1200-<br>1000 | 14-9·5 | 1 3·9-in. A.A. | 7 | .. |
| Circé<br>Calypso<br>Doris<br>Thetis | Chalons | Bldg. | 204·5 | 17·5 | 11 | 2 | 600-765 | 1250-<br>1000 | 14-9·5 | 1 3·9-in. A.A. | 7 | .. |
| Naïde<br>Sirène<br>Nymphe<br>Galatée | St. Nazaire | Bldg. | 210 | 17 | 11·5 | 2 | 590-750 | 1300-<br>1000 | 14-9·5 | 1 3·9-in. A.A. | 7 | .. |
| Brumaire, Frimaire<br>Euler | Cherbourg | 1911<br>1912 | 171 | 18·0 | 10·3 | 2 | 398-550 | 700 | 13-9 | .. | 7 | 24 |
| Newton<br>Curie,<br>Le Verrier | Rochefort<br>Toulon | 1912<br>1912<br>1912 | 168 | 16·4 | 10·3 | 2 | 398-550 | 840 | 13-9 | .. | 7 | 24 |
| Clorinde, Cornélie,<br>Amphitrite, Astrée<br>Artémis, Aréthuse,<br>Atalante, Amaranthe,<br>Andromaque | Rochefort<br>Toulon<br>Cherbourg | 1913<br>1914<br>1913<br>1913<br>1913 | 174 | 16·9 | 10·9 | 2 | 410-560 | 1,300 | 14-8 | .. | 8 | 30 |
| Néréide | Cherbourg | 1914 | 243 | 19·8 | 13·8 | 2 | 800-1000 | 2,400 | 16-10 | 1 14-pr. | 8 | 40 |
| Bellone, Hermione,<br>Gorgone | Rochefort<br>Toulon | 1914 &<br>1915 | 198·9 | 17·7 | 11·9 | 2 | 520-790 | 1,800 | 16-9 | 1-3 pr. .. | 8 | 29 |
| Gustave Zédé | Cherbourg | 1913 | 243 | 19·7 | 13·8 | .. | 850-1100 | 2,900 | 16-10 | 1 14-pr.<br>1 3-pr. | 8 | 40 |
| Daphne | Cherbourg | 1915 | 223 | 18·0 | 12·0 | 2 | 749-900 | 1800-<br>1600 | 15-11 | 1 75-mm., 1 M. | 10 | 40 |
| Joessel, Fulton | Cherbourg | 1917 | 243 | 20·0 | 13·4 | 2 | 915-1200 | 2900-<br>1650 | 16¼-11 | 2 14-pr. .. | 8 | 40 |
| Laplace<br>Lagrange<br>Romazzotti, Regnault | Rochefort<br>Toulon<br>Toulon | 1917<br>1917<br>1918 | 247 | 21·0 | 13·0 | 2 | 840-1317 | 2,600 | 16½-11 | 2 14-pr. .. | 8 | .. |
| Amazone, Antigone,<br>Arnide | Schneider | 1916 | 184·6 | 17·0 | 10·6 | 2 | 467-665 | 2,000 | 17¼-11 | 1 1-pr., 1 M. | 6 | .. |
| O'Bryne,<br>L. Dupetit-Thouars,<br>Henry Fournier, | Chalons | 1919 &<br>1920 | 172 | 15·6 | 9·6 | .. | 335-502 | 1020-<br>460 | 14-8½ | 1 3-pr. .. | 4 | 24 |
| Dupuy de Lôme, Sané | Chalons | 1916 | 246 | 20·9 | 13·7 | .. | 854-1291 | 2900-<br>1640 | .. | 2 14-pr. .. | 8 | 40 |
| Pierre Chailley | Havre | 1922 | 229·7 | 26 | 13 | .. | 866-1171 | 1800-<br>1400 | 13·5-<br>8·5 | 1 12-pr., 2 M.<br>24 mines | 4 | .. |
| Maurice Callot | Bordeaux | 1921 | 247·8 | 22 | 12·3 | .. | 861-1211 | 2900-<br>1600 | 16½-10 | 1 12-pr., 2 M.<br>27 mines | 4 | .. |
| Roland Morillot (*ex*-U.B. 26) | Germany | 1916 | 118·6 | 15 | 12 | 2 | 260-318 | 284-<br>280 | 8·5-6 | 1 3-pr., 1 M | 2 | 23 |
| Pierre Marrast<br>Jean Roulier | „ | 1918 | 235 | 21 | 12·7 | 2 | 820-1020 | 2,400 | 16-8·5 | 1 4-in. | 6 | 40 |
| Halbronn | „ | 1918 | 302·2 | 29·5 | 15·5 | 2 | 2000 | 3,500 | .. | 1 5·9-in. | .. | .. |
| Jean Antric<br>Leon Mignot | „ | 1917 | 285 | 21 | 12·5 | .. | 800-1040 | 2,400 | 16·5-<br>8·5 | 1 4·1-in. | 6 | 40 |
| Jean Corre<br>Carissan<br>Trinité Schillemans | „ | 1917<br>1918 | 181 | 19 | 12 | .. | 520-620 | 1,100 | 14-8 | 1 4·1-in. | 5 | 34 |
| René Audry | „ | 1917 | 267·5 | 24 | 14 | .. | 1160 | 2,400 | 15-7·5 | 1 5·9-in.,<br>40 mines | 4 | 40 |
| Victor Réveille | „ | 1916 | 200 | 19 | 16 | .. | 700 | 1,200 | 10-8 | 1 4·1-in.,<br>36 mines | 2 | .. |

In addition to the above, about 30 submarines are projected.

## Greece.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Coal Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| DESTROYERS— | | | | | | | | | | | | | |
| Thyella ..<br>Sphendoni ..<br>Lonchi .. | Yarrow .. | 1906 | 220 | 20·6 | 6·0 | 2 | 350 | 6000 | 31·79<br>31·84<br>32·53 | 2 12, 4 6-pr. | 2 | 70 | 80 |
| Smyrna (*ex* Austrian Ulan) .. | Trieste | 1907 | 220 | 20 | 6·6 | 2 | 400 | 6000 | 28 | 4 11-pr.,<br>2 11-pr., A.A. | 2 | 86 | 90 |
| Nike ..<br>Aspis ..<br>Velos .. | Stettin (Vulcan) | 1906 | 220 | 20·6 | 7·2 | 2 | 350 | .. | 30 | 2 12, 4 6-pr. | 2 | 58 | 80 |
| Aetos, Leon, Panthir, Jerax .. | Birkenhead | 1911 | 293 | 27·7 | 9·6 | .. | 980 | 19,750 | 32 | 4 4-in.,<br>1 6-pr., A.A. | 4 | 110 | 225 |

Six 125-ton torpedo-boats built by the Vulcan Co. at Stettin: Arethusa, Doris, Aigli, Dafni, Alkyonis, Thetis, 25 knots.
The surrendered Austrian torpedo boats: Pergamos, 92 F, 94 F, Proussa, 99 M and 100 M, 250 tons, have been added to the Greek Navy for police duties.
Orders have been placed for two submarines of 600 tons with the French firm of Schneider-Creusot.

## Italy.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| | | | Feet. | Feet. | Feet. | | Tons | | Knots. | | | | Tons. |
| FLOTILLA LEADERS *— | | | | | | | | | | | | | |
| Alessandro Poerio ..<br>Gulielmo Pepe .. | Genoa (Ansaldo) | 1914 | 279 | 26·3 | 9·3 | 2 | 910 | 20,000 | 32 | 5 4-in., 2<br>2-pr., A.A. | 2 dbl. | 100 | 400 |
| Cesare Rossarol, *ex*-German B97 .. | Hamburg | 1915 | 321 | 30·9 | 9·9 | 2 | 1354 | 40,200 | 37·5 | 3 4·7-in.,<br>24 mines, 2<br>14-pr., A.A. | 6 | .. | 526 |
| Premuda, *ex*-German V116 .. .. .. | Germany | 1918 | 340 | .. | .. | .. | 2300 | 56,000 | 36 | 4 5·9-in., 2<br>14-pr., A.A. | 4 | 154 | 720 |
| DESTROYERS— | | | | | | | | | | | | | |
| Francesco Crispi ..<br>Giovanni Nicoteva<br>Bettino Ricasoli ..<br>Quintino Sella .. | Naples (Pattison) | Bldg. | 271 | 28 | 10 | .. | 1100 | 28,000 | 35 | 3 4·7-in. | 6 | .. | 220 |
| Alpino .. .. ..<br>Corazziere .. ..<br>Pontiere .. .. ..<br>Carabiniere .. ..<br>Fuciliere .. .. .. | Genoa (Ansaldo) | 1909<br>1910 | 211·6 | 20·0 | 7·6 | 2 | 420 | 6,500 | 29 | 4 14-pdr. | 3 | 55 | 82 |
| Impavido .. .. ..<br>Indomito .. .. ..<br>Insidioso .. .. ..<br>Irriquieto .. .. .. | Naples (Pattison) | 1912 & 1913 | 246 | 24·0 | 8·4 | 2 | 650 | 15,000 | 35·2 | 5 4-in., 2<br>2-pr., A.A. | 2 | 71 | 110 |
| Ardito .. .. ..<br>Ardente .. .. .. | Orlando (Leghorn) | 1912 & 1913 | 238 | 24·0 | 8·4 | 2 | 680 | 15,000 | 33·4 | 5 4-in., 2<br>2 pr., A.A. | 2 | 71 | 110 |
| Ascaro .. .. .. | Ansaldo .. | 1912 | 211·5 | 20·0 | 7·0 | 2 | 390 | 6,000 | 29 | 2 14-pr.<br>4 6-pr. | 3 | 50 | 80 |
| Giuseppe Sirtori ..<br>Vicenzo Orsini ..<br>Francesco Stocco ..<br>Giovanni Acerbi .. | Genoa (Odero) | 1916<br>1917<br>1916<br>1916 | 238 | 24 | 9·0 | 2 | 800 | 17,000 | 33 | 6 4-in., 2<br>2-pr., A.A.<br>Carries<br>10 mines. | 4 | 100 | 150 |
| E. Cosenz .. ..<br>Giacoma Medici ..<br>G. La Farina .. ..<br>Nicola Fabrizi ..<br>Angelo Bassini ..<br>Giacinto Carini ..<br>G. La Masca .. .. | Genoa (Odero) | 1918<br>1917<br>1918<br>1917<br>1917<br>1917<br>1917 | 238 | 24 | 9·0 | 2 | 800 | 17,000 | 33 | 4 4-in., 2<br>12-pr., 2<br>M. Carries<br>10 mines. | 4 | 100 | 150 |

In addition to the above, four new destroyers will be laid down similar to the Cristi class.

* For five scouts built and three building, intended also to act as flotilla leaders, see the Italian light-cruiser list, pp. 403, 403.

## Italy—*continued.*

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| Destroyers—*contd.* | | | | | | | | | | | | | |
| Fratelli Cairoli<br>Antonio Mosto | Naples (Pattison) | 1914<br>1914 | 236 | 24 | 8·8 | 2 | 750 | 14,500 | 30·8 | 5 4-in., 2 2-pr. A.A. | 4 | 71 | 150 |
| Rosolino Pilo<br>Giuseppe Abba<br>Ippolito Nievo<br>Simone Schiaffino<br>Giuseppe Dezza<br>Giuseppe Missori | Genoa (Odero) | 1914<br>1915 | | | | | | 17,000 | 32 | | | | |
| Gen. A. Cantore<br>Gen. A. Chinotto<br>Gen. A. Papa<br>Gen. A. Cascino<br>Gen. M. Prestinari<br>Gen. C. Montanari | Genoa (Odero) | 1921<br>1922 | 238 | 24 | 9·0 | 2 | 800 | 18,000 | 33 | 4 4-in., 2 14-pr., | 4 | 100 | 150 |
| Audace | Yarrow | 1918 | 275 | 27·6 | 8·3 | 2 | 955 | 21,500 | 36 | 1 4-in.<br>6 3-in. | 2 dbl. | 111 | 252 |
| Ardimentoso, *ex*-S. 63 | Schichau | 1915 | 274 | 27·3 | 8·6 | 2 | 908 | 23,000 | 31·5 | 3 4·1-in. | 6 | | 305 |
| Solferino, Palestro<br>S. Martino, Curtatone<br>Confienza, Castelfidardo, Calatafimi,<br>Monzambano | Leghorn (Orlando) | 1921<br>1922<br>1923 | 270<br>280 | 26·5 | 8·6 | 2 | 927 | 27,000 | 32 | 4 4-in., 2 12pr., A.A. | 4<br>6 | .. | 170 |
| Cortellazzo<br>Fasana<br>Grado<br>Monfalcone<br>Muggia<br>Pola<br>Zenzon | Danubius *ex*-Austrian | 1916<br>1920 | 275 | 25·5 | 8 | 2 | 850 | 20,600 | 32·5<br>33 | 2 3·9-in.<br>4 3-in.<br>2 3-in., A.A. | 4 | 102 | 95 |
| First Class— | | | | | | | | | | | | | |
| Calipso<br>Climene | Naples (Pattison) | 1909<br>1909 | 164·3 | 17·4 | 7 | 2 | 120 | 3,100 | 26·0 | 2 14-prs. | 2 | 35 | 30 |
| P.N., 1-4, 6-12, 33-38, 40-45, 64, 65, 69-71 | Pattison | 1912 & 1913 | 139 | 13·9 | 5·5 | 2 | 130 | 2,500 | 27 | 1 6-pr. | 2 | .. | 15 |
| A.S., 25-30, 52-57 | Ansaldo | | | | | | | | | | | | |
| O.S., 13-16, 18-24, 27, 28, 30, 47-51 | Odero | 1914 | | | | | | | | | | | |
| O.L., 58-63<br>O.L.T., 74, 75 | Orlando<br>Orlando | 1916<br>1920 | 139 | 13·5 | 5·5 | 2 | 157 | 3,000 | 27-29 | 2 14-pr. A. A. | 2 | .. | 25 |
| C.P., 76-79 | Palermo | Bldg. | 154 | .. | .. | .. | .. | 3,000 | .. | 2 14-pr., A.A. | 1 dbl. | .. | .. |
| Submarines— | | | | | | | | | | | | | |
| L. Galvani, E. Torricelli, P. Micca | Spezia | | | | | | | | | | | | |
| L. Mocenigo<br>L. Marcello<br>A. Emo | Venice | 1917<br>1919 | 207·5 | 20·3 | 15·6 | .. | 830<br>1000 | 2600<br>1230 | 15-9·5 | 2 14-pr. A.A. | 6 | .. | .. |
| A. Barbarigo<br>A. Provana<br>S. Veniero<br>G. Nani | Spezia, F.I.A.T. | | 218·0 | 19·0 | 15·6 | .. | 740<br>920 | | 17-9·2 | | | | |
| X 2, 3 | Ansaldo | 1917 | 139·9 | 18 | 11 | .. | 400<br>460 | 660<br>320 | 9·2-6·3 | 1 12-pr.<br>18 mines | 2 | .. | 14½ |
| H 1 to 4, 6 to 8 | Vickers | 1917 | 150 | 16 | 12 | .. | 360<br>440 | 480<br>320 | 12-8·9 | 1 12-pr. | 4 | 22 | 14 |
| F 1, 2, 5, 6, 7, 9, 10, 12-21 | F.I.A.T.<br>Odero<br>Orlando | 1913<br>1917<br>1918 | 148 | 14 | 10 | .. | 260<br>380 | 700<br>320 | 13-8·5 | 1 12-pr. A.A. | 2 | 22 | 12 |
| Argonauta | Ansaldo | 1915 | 148·3 | 13·9 | 9-1 | .. | 250<br>300 | 700<br>250 | 13-9 | 1 12-pr. A.A. | 2 | 21 | .. |
| N 1 to N 4<br>N 5, N 6 | Ansaldo<br>Taranto | 1917<br>1918<br>1917 | 150 | 14 | 9-9 | .. | 270<br>350 | 700<br>320 | 13·6-8 | 1 12-pr. A.A. | 2 | 21 | 9 |

**Four new ocean-going submarines laid down 1924, named Babilla, Antonio Sciesa, Enrico Toti, and Domenico Millelire. Surface displacement 1280 tons.**

## Japan.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| DESTROYERS: | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| FIRST CLASS— | | | | | | | | | | | | | |
| Umikaze, Yamakase | Maidzuru and Nagasaki .. | 1910–11 | 310·0 | 28·0 | 9·0 | 3 | 1150 | 20,500 | 33 | 2 4·7-in.,<br>5 12-pr. | 4 | 139 | 430 |
| Amatsukaze .. ..<br>Tokitsukaze .. ..<br>Isokaze .. .. ..<br>Hamakaze .. .. | Kure and Nagasaki .. | 1916 | 310·0 | 28·0 | 9·3 | 3 | 1227 | 27,000 | 34 | 4 4·7-in., 2 M. | 6 | 145 | 340 |
| Tanikase .. .. ..<br>Kawakase .. .. | Maidzuru ..<br>Yokosuka .. | | | | | | 1300<br>1300 | | | 3 4·7-in.,<br>2 M. | 6 | 128 | .. |
| Sawakase.. .. ..<br>Okikase, Shimakase,<br>Nadakase, Yakase,<br>Hakase, Minekase | Mitsubishi..<br>Maidzuru .. | 1916–19 | 320 | 29·3 | 9·5 | 2 | 1345 | 38,000 | 34 | 4 4·7-in.,<br>2 M. | 6 | 145 | .. |
| Sezukase, Soyokase,<br>Tsumujikase,<br>Makase, Okase,<br>Namikase,<br>Numakase, Nokase,<br>Tashikase, Shiokase,<br>Hokase, Yukase,<br>Akikase<br>Nos. 11, 13, 15 | Mitsubishi,<br>Kawasaki,<br>Maidzuru | 1920–2 and Bldg. | 320 | 29 | 9·5 | 2 | 1400 | 38,500 | 34 | 4 4·7-in.<br>2 M. | 6 | .. | .. |
| SECOND CLASS – | | | | | | | | | | | | | |
| Sakura, Tashibana.. | Maidzura .. | 1912 | 274 | 24·0 | 7·9 | 3 | 600 | 9,500 | 30 | 1 4·7-in.<br>4 12-pr. | 4 | 92 | 230 |
| Kaba .. .. ..<br>Kaede .. .. ..<br>Kashiwa .. .. ..<br>Katsura .. .. ..<br>Kiri .. .. .. ..<br>Kusunoki .. ..<br>Matsu .. .. ..<br>Sakaki .. .. ..<br>Sugi .. .. .. ..<br>Ume .. .. .. .. | Yokosuka ..<br>Maidzuru ..<br>Nagasaki ..<br>Kobe .. ..<br>Uraga.. ..<br>Sasebo and Osaka.. .. | 1915 | 274·0 | 24·0 | 7·9 | 2 | 665 | 9,500 | 30 | 1 4·7 in.<br>4 12-pr. | 4 | 92 | 230 |
| Momo, Yanagi ..<br>Kashi, Hinoki .. | Sasebo.. ..<br>Maidzuru .. | 1916–17 | 275·0 | 25·0 | 7·9 | 2 | 835 | 16,000 | 31·5 | 3 4·7 in.,<br>2 M. | 6 | 109 | 300 |
| Nara .. .. .. ..<br>Kuwa, Tsubaki ..<br>Maki, Keyaki .. ..<br>Enoki .. .. ..<br>Momi, Take .. ..<br>Nashi, Kaki .. ..<br>Kaya, Kure .. ..<br>Nire, Tsuga .. .. | Yokosuka ..<br>Kure .. ..<br>Sasebo.. ..<br>Maidzuru ..<br>Maidzuru, etc. | 1917–18 | 275·0 | 26·0 | 8·0 | 2 | 835<br>900 | 21,000 | 31·5 | 3 4·7 in.,<br>2 or 3 M.,<br>A.A. | 4 or 6 | 110 | .. |
| Urakaze .. .. .. | Yarrow .. | 1915 | 275·3 | 27·6 | 9·5 | 2 | 955 | 22,000 | 28 | 1 4·7-in.,<br>4 12 pr. | 4 | 117 | 248 |
| Kiku, Aoi, Hagi,<br>Susuki, Fuji, Tsuta,<br>Hishi, Hasu, Ashi,<br>Warabi, Sumire,<br>Tade, Yomogi,<br>Karukaya, Kikyo,<br>Yuri, Ayame,<br>Kaido, Kakitsubata.<br>Tsutsuji, Ajisai | Kobe, Uraga,<br>Ishikawa-jima,<br>Fujinagata,<br>Kawasaki | 1920–1922 | 275·5 | 24 | 8 | 2 | 850 | 21,000 | 31·5 | 3 4·7 in.<br>3 M., A.A. | 4 | 110 | .. |

Completed in 1923, six second-class destroyers, 900 tons, 33 knots, with three 4·7-in. guns and 4 or 6 T.T.: Tade, Shion, Nadeshiko, Botan, Omodaka, Basho. Another four building. Also eight of the powerful "Kase" class—the later boats reported to displace 1900 tons and to mount 4·7-in. guns, with 3, 4, or 6 T.T.—are building and twenty-five are projected.

## Japan—*continued.*

| Name or Number. | Where Built. | Launched. | Dimensions. |  |  | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  | Length. | Beam. | Draught. |  |  |  |  |  |  |  |  |
|  |  |  | Feet. | Feet. | Feet. |  | Tons. |  | Knots. |  |  |  | Tons. |
| SUBMARINES— |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Nos. 8, 9 .. .. .. | Vickers .. | 1908 | .. | .. | .. | .. | 285<br>315 | 600<br>180 | 13·8 | .. | 2 | .. | .. |
| ,, 10, 11, 12 .. | ,, .. | 1911 | .. | .. | .. | .. | 290<br>320 | 600<br>300 | 13–8 | .. | 2 | .. | .. |
| ,, 13 .. .. .. | ,, Kobé | 1911 | .. | .. | .. | .. | 300<br>330 | 1000<br>300 | 14–8 | .. | 2 | .. | .. |
| ,, 14–24 .. .. | Kure, Kobe | 1918–20 | .. | .. | .. | .. | 740<br>1110 | 2600<br>1200 | .. | 1 12-pr.<br>1 3-pr. | 6 | .. | .. |
| ,, 25–30 .. .. | M.B., Kobe | 1919–20 | .. | .. | .. | .. | 900<br>1082 | 2600<br>1200 | 17–10·5 | 12-pr. A.A.<br>1 3-pr. | 6 | .. | .. |
| ,, 31–33 .. .. | .. | 1921 | .. | .. | .. | .. | 700<br>1072 | 2600<br>1200 | 17–10 | 1 12-pr. A.A.<br>1 3-pr. | 5 | .. | .. |
| ,, 34–45 .. .. | Kure, Sasebo | 1920–21 | .. | .. | .. | .. | 740<br>1100 | 2600<br>1200 | 17–10 | 12-pr A.A.<br>1 3-pr. | 6 | .. | .. |
| ,, 46–59 .. .. | Yokosuka .. | 1921–22 | .. | .. | .. | .. | 900<br>1082 | 2400<br>1600 | 17-10·5 | 1 12-pr.<br>1 3-pr. | 4 21-in. | .. | .. |

Thirty-two additional submarines are projected and building. The surface displacement in some of these is increased to about 1,250 tons or more, and the range extended to 11,000 miles. It is stated that the surface speed is 17 knots, that some of the boats will carry a 5·5-in. gun, and have from four to six T.T., and that some are fitted as mine-layers. When No. 77 sank off Awaji Island on August 21, 1923, it transpired that the complement was 95, as compared with 65 in the British M. class boats.

## Netherlands.

| Name or Number. | Where Built. | Launched. | Dimensions. |  |  | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  | Length. | Beam. | Draught. |  |  |  |  |  |  |  |  |
|  |  |  | Feet. | Feet. | Feet. |  | Tons. |  | Knots. |  |  |  | Tons. |
| DESTROYERS— |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Wolf, Fret (1909) ..<br>Bulhond, Jakhals (1910)<br>Hermelijn, Lynx, Panter, Vos (1911) | Flushing ..<br>Rotterdam | 1910–1913 | 230 | 22 | 9 | 2 | 510 | 8,500 | 30 | 4 2·9-in. semi-aut.<br>4 M. | 2 | 84 | 120 |
| FIRST CLASS— |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Zeeslang, Krokodil, Draak, Hydra, | Flushing .. | 1905 | 152·6 | 15·3 | 7·9 | 1 | 104 | 1200–1560 | 27 | 2 1-prs. | 2 | 20 | 20 |
| G 13–15–16 .. .. | Scheldt ..<br>Fijenoord .. | 1913–1914 | 162·5 | 17·3 | 9·0 | .. | 180 | 2,600 | 26 | 2 13-pr. | 3 | 25 | 40 |
| Z 1–4.. .. .. .. | Amsterdam | 1916–1917 | 201 | 20·4 | 6 | 2 | 322 | 5,500 | 27 | 2 13-pr.,<br>2 M. | 4 | 39 | 70 |
| Z 5-8.. .. .. .. | Scheldt ..<br>Fijenoord .. | 1915 | 192 | 19·8 | 5·5 | 2 | 310 | 5,500–5,700 | 27 | 2 13-prs.,<br>2 M. | 4 | 39 | 81 |

The named destroyers and first-class boats belong to the forces of the Dutch Indies. The other torpedo-boats are in Holland.

SUBMARINE boats.—O 2 and 3, 132–150 tons, 11·8 knots, 2 tubes. O 4 and 5, 380 tons, 151 ft. 6 in. long, 16 knots (surface), 11 knots (submerged) speed. O 6 and 7, built in Holland, 178–234 tons. British interned submarine bought by the Dutch Government and taken over as O 8, June, 1917; O 9–11 building. M 1 submarine mine-layer. K submarines for the East Indies: K 1, 320–380 tons, 3 tubes; K 2–7, 560–700 tons, 1 2·9-in.; 1 M., 6 tubes, 16·10 knots; K 8–10, 570-700 tons, 1 3·4-in., 1 M., 4 tubes: K 11–13 building and O 9–14 building or projected.

## Norway.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| **Destroyers—** | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| Draug, Troll, Garm | Horten .. | 1908–13 | 226 | 23·5 | 8·8 | 2 | 540 | 7,500 | 27·0 | 6 12-pdrs. | 3 | 71 | 95 |
| **First Class—** | | | | | | | | | | | | | |
| Snoegg, Stegg, Trygg | Horten .. | 1919–1920 | 175 | 18 | 5½ | 2 | 220 | 3,500 | 25 | 2 12-pdr. | 4 | 31 | 30 |
| **Second Class—** | | | | | | | | | | | | | |
| Hval, Delfin .. .. | Elbing .. | 1896–1900 | 130·0 | 15·0 | 6·9 | 1 | 84 | 1,100 | 24·5 | 2 1·4-in.Q.F. | 2 | 19 | 17 |
| Storm, Brand, Trods | Horten .. | | 128·0 | 15·0 | .. | 1 | 84 | 1,100 | 23 | 2 1·4-in. Q.F. | 2 | 19 | 17 |
| Laks, Sild, Sael, Skrei | Horten .. | 1901 | 128·0 | 15·0 | 6·9 | 1 | 84 | 1,100 | 23 | 2 1·4-in. | 2 | 19 | 17 |
| Kjek, Hvas, Dristig, Kvik, Djerv, Blink, | Fredrikstad | 1898 | 111·5 | 14·5 | 6·3 | 1 | 65 | 650 | 19 | 2 1·4-in. | 2 | .. | .. |
| Lyn, Hauk, Falk, Glimt .. .. .. | Horten .. | 1903 | | | | | | | | | | | |
| Skarv, Teist, Lom, Jo, Grib .. .. | Horten .. | 1906–7 | 134·5 | 14·9 | .. | 1 | 100 | 1,700 | 25·0 | 2 3-pr. | 2-3 | 18 | 16 |
| Ravn, Orn .. .. | Horten .. | 1903 | 119 | 14·9 | 6·4 | 1 | 73 | 1,035 | 22·5 | 2 1·4-in. | 2 | 16 | 15 |
| Kjeld.. .. .. .. | Horten .. | 1912 | 135 | 14·9 | 6·4 | 1 | 100 | 1,800 | 25 | 1 12-pr. | 3 | 19 | 16 |
| **Submarines—** | | | | | | | | | | | | | |
| A 1, 2, 3, 4 .. .. | Germania Kiel | 1909 to 1913 | 131·6 | 14·9 | 9·6 | 2 | 220<br>255 | 440<br>250 | 12<br>9 | .. | 3 | 17 | .. |
| B 1, 2 .. .. .. | Horten .. | 1922 | .. | .. | .. | .. | 413–545 | .. | 15–11 | .. | .. | .. | .. |
| B 3, 4 .. .. .. | Horten .. | Bldg. | | | | | | | | | | | |
| **Mining Vessels:—** | | | | | | | | | | | | | |
| Froeya .. .. .. | Horten .. | 1917–1918 | 250 | 27 | 8½ | 2 | 755 | .. | 22 | 4 4-in. | 2 | 80 | 95 |
| Glommen, Laugen.. | Christiania.. | | 138 | 28 | 6½ | 2 | 335 | 350 | 9·5 | 2 12-pdr. | .. | 39 | 21 |

## Spain.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| **Flotilla Leaders—** | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| Churraca .. .. .. | | Bldg. | 320 | 31·8 | 10·5 | 2 | 1,650 | 42,000 | 36 | 5 4·7-in.<br>1 14-pr.<br>A A. | 6 | .. | 540 |
| Alacala Galiano .. | | | | | | | | | | | | | |
| Sanchez .. .. .. | | | | | | | | | | | | | |
| Barcairtegui .. .. | | | | | | | | | | | | | |
| **Destroyers—** | | | | | | | | | | | | | |
| Alcedo .. .. .. | Cartagena .. | 1922 | 275 | 27 | 10·5 | .. | 1,145 | 33,000 | 34 | 3 4-in., 2<br>2-pr. A.A. | 4 | .. | 265 |
| Velasco .. .. .. | | 1923 | | | | | | | | | | | |
| Juan Lazaga .. .. | | Bldg. | | | | | | | | | | | |
| Terror, Audaz.. .. | Clydebank .. | 1896<br>1897 | 220<br>229 | 22 | 9·9 | 2 | 457 | 6,000<br>7,950 | 29 | 2 14-pr. 2<br>6-pr. 21-pr. | 2 | 74 | 100<br>93 |
| Osado, Proserpina .. | Clydebank .. | 1897 | 229 | 22 | 9·9 | 2 | 457 | 7,500 | 30 | 2 14-pr. 2<br>6-pr. 2 1-pr | 2 | 74 | 90 |
| Bustamente .. .. | Cartagena .. | 1913–1915 | 220 | 22 | 5·6 | .. | 364 | 6,250 | 28 | 5 6-pr. | 2 | 70 | 80 |
| Villaamil .. .. .. | Cartagena .. | | | | | | | | | | | | |
| Cadarso .. .. .. | Cartagena .. | | | | | | | | | | | | |
| **Torpedo Boats—** | | | | | | | | | | | | | |
| 22 boats .. .. .. | Cartagena .. | 1913–1922 | 164 | 16·5 | 4·9 | 3 | 177 | 3,750 | 26 | 3 3-pr. | 3 | .. | .. |

In September, 1917, three submarines (A 1, 2 and 3), built in Italy, were delivered (260–383 tons, 700–500 h.p.. 13–8·5 knots, two tubes), and six others, 610–740 tons, 17–10·5 knots, two 12-pr. 6 T.T., will give Spain a flotilla of ten boats, the tenth being the Peral (500–685 tons, 17–10·5 knots, one 12-pr., 4 tubes).

In addition, six boats of a somewhat larger type (900–1100 tons, 16 knots, with one 75 mm. A A. gun, and six 21-in. tubes) were laid down in 1923.

## Sweden.

| Name or Number. | Where Built. | Launched. | Dimensions. | | | Number of Screws. | Displacement. | Indicated Horse-Power. | Maximum Trial Speed. | Armament. | Torpedo Tubes. | Complement. | Fuel Capacity. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Length. | Beam. | Draught. | | | | | | | | |
| | | | Feet. | Feet. | Feet. | | Tons. | | Knots. | | | | Tons. |
| **Destroyers—** | | | | | | | | | | | | | |
| Mode | Yarrow | 1902 | 220·3 | 20 6 | 8·9 | 2 | 480 | 6,800 | 32·4 | 6 6-prs. | 2 | 67 | 95 |
| Magne | Thornycroft | 1905 | 216·9 | 20·8 | 8·2 | 2 | 480 | 8,000–<br>9,000 | 30·0 | 4 14-prs.<br>4 6-prs. | 2<br>dbl. | 67 | 90 |
| Wale | Malmo | 1906 | | | | | | | | | | | |
| Ragnar | Malmo | 1909 | | | | | | | | | | | |
| Sigurd | Gothenburg | 1909 | | | | | | | | | | | |
| Vidar | Malmo | 1909 | | | | | | | | | | | |
| Hugin | Gothenburg | 1909 | | | | | | | | | | | |
| Munin | Malmo | 1910 | | | | | | | | | | | |
| Wrangel | Gothenborg | 1917 | 230 | 22 | 9·2 | 2 | 500 | 12,000 | 34·0 | 4 14-prs. | 2<br>dbl. | .. | 10 |
| Wachtmeister | | | | | | | | | | | | | |
| **Torpedo-Boats—** | | | | | | | | | | | | | |
| Plejad, Castor, Pollux | Normand & Carlskrona | 1905–1909 | 125 | 14·4 | 6·6 | 1 | 106 | 1,900 | 26 | 2 1·5-in. Q.F. | 2 | 18 | 20 |
| Vega | Carlskrona | 1909 | 128 | 14·4 | 8·6 | 1 | 105 | 1,900 | 25 | 2 6-prs. | 2 | 18 | 20 |
| Vesta | | | | | | | | | | | | | |
| Spica, Astrea, Iris, Thetis | Bergsund and Gothenburg | 1909 | 128 | 17·5 | 8·6 | 1 | 120 | 1,900 | 25 | 2 6-prs. | 2 | 18 | 20 |
| Altair | Stockholm | 1908 | 128 | 17·5 | 8·6 | .. | 110 | 2,000 | 25 | 2 6-prs. | 2 | 18 | 20 |
| Antares | | | | | | | | | | | | | |
| Argo | | | | | | | | | | | | | |
| Arcturus | | | | | | | | | | | | | |
| Perseus, Polaris | Bergsund | 1910–1915 | 128 | 14·4 | 8·6 | 1 | 115 | 2,000 | 25 | 2 6-prs. | 2 | 18 | 20 |
| Regulus, Rigel | Stockholm | | | | | | | | | | | | |

Also ten small torpedo-boats, 60 tons, built 1907–1908.

Submarines: Bävern, Valrossen, Illern, Uttern, Sälen, Valen, 460 tons (1920–21), Hajen, 107–127 tons (1920), Gädden, Braxen, Laxen, Aborren, 200 tons (1915–16), Delfinen, 250 270 tons, one M., 2 T.T. (1915), Tumlaren, Svaerdfisken (1914), 250–370 tons. Nos. 2–4 (1904–10). Details of the Swedish submarines are given under reserve. The facts are confidential. The new programme includes additional submarines.

## United States

No destroyers are, at the present time, building for the United States Navy. The oldest class, 21 in number, date from 1910–12, and will probably soon be removed from the list. They are 21-knot boats of 742 tons, and 12,000 H.P., five 13-prs. and three double 18-in. T.T. Their names are:

Paulding, Drayton, Roe, Terry, Perkins, Sterett, McCall, Burrows, Warrington, Mayrant, Monaghan, Trippe, Walke, Ammen, Patterson, Fanning, Jarvis, Henley, Beale, Jouett, Jenkins.

The next class (1913–16), 19 in number, of 1020–1150 tons and 16,000–18,000 H.P., 29–30 knots, mount four 4-in. guns, and have four double 18-in. or 21-in. T.T. They are:

Cassin, Cummings, Downes, Duncan, Aylwin, Parker, Benham, Balch, O'Brien, Nicholson, Winslow, McDougal, Cushing, Ericsson, Tucker, Conyngham, Porter, Wadsworth, Wainwright.

A very extensive class follows (1916-20), comprising 121 vessels. The displacement approximates 1,185 tons in the later boats, the H.P. increases to 27,000, and the speed, from the Ringgold onward, reaches 35 knots. The armament of this class is four 4-in., and two 14-pr. A.A., with four triple 21-in. T.T. They are:

Sampson, Rowan, Davis, Allen, Wilkes, Shaw, Caldwell, Craven, Gwin, Conner, Stockton, Manley, Wickes, Philip, Evans, Little, Kimberley, Sigourney, Gregory, Stringham, Dyer, Colhoun, Stevens, McKee, Robinson, Ringgold, McKean, Harding,† Gridley, Fairfax, Taylor, Bell, Stribling,* Murray,* Israel,* Luce,* Maury,* Lansdale,* Mahan,* Schley, Champlin, Mugford,† Chew, Hazelwood, Williams, Crane, Hart,* Ingraham,* Ludlow,* Rathburne, Talbot, Waters, Dent, Dorsey, Lea, Lamberton, Radford, Montgomery, Breese, Gamble, Ramsay, Tattnall, Badger, Twiggs, Babbitt, Jacob Jones,* Buchanan, Aaron Ward, Hale, Crowninshield, Boggs, Kilty, Kennison, Ward,* Claxton, Hamilton, Tarbell, Yarnall, Upshur, Greer, Elliot, Roper, Breckinridge, Barney, Blakeley, Biddle, Du Pont, Bernadou, Ellis, Cole, J. Fred Talbot, Dickerson, Leary, Schenck, Herbert, Palmer, Thatcher, Walker, Crosby, Meredith, Bush, Cowell, Maddox, Foote, Kalk, Burns,* Anthony,* Sproston,* Rizal,* Mackenzie, Renshaw, O'Bannon, Hogan, Howard, Stansbury, Hopewell, Thomas, Haraden, Abbot, Bagley, Clemson.

The final class (1919–22) is of the same type, and comprises 155 vessels. The displacement is 1,215 tons and the H.P. 27,000. All these vessels have oil fuel and geared turbines, many of them electric drive, and the designed speed is 35 knots. The armament is the same as in the preceding list, except that there is but one 14-pr. A.A. There are a few exceptions, the Long having eight 4-in., the Kane, Fox, Gilmer, Brooks, and Hatfield four 5-in., and the Tillman two 13-pr. A.A. Seven vessels of this class, Delphy, S. P. Lee, Chauncey, Fuller, Woodbury, Nicholas, and Young, were involved in the disaster of September 9, 1923, when, steaming at 20 knots in fog and heavy tide, they ran on the rocks near Santa Barbara. The list of the class is as follows:

Dahlgren, Golsborough, Semmes, Satterlee, Mason, Abel P. Upshur, Hunt, Welborn C. Wood, George E. Badger, Branch, Herndon, Dallas, Chandler, Southard, Hovey, Long, Broome, Alden, Smith Thompson, Barker, Tracy, Borie, John D. Edwards, Whipple, Parrott, Stewart, Hatfield, Brooks, Gilmer, Fox, Kane, Humphreys, McFarland, James K. Paulding, Overton, Sturtevant, Childs, Sands, Reuben James, Belknap, McCook, Rodgers, Ingram-Osmond, Bancroft, Welles, Aulick, Turner, Gillis, Delphy, McDermut, Laub, McLanahan, Edwards, Greene, Ballard, Shubrick, Bailey, Thornton, Morris, Tingey, Swasey, Meade, Sinclair, McCawley, Moody, Henshaw, Meyer, Doyen, Sharkey, Toucey, Breck, Isherwood, Case, Lardner, Putnam, Worden, Flusser, Dale, Reid, Chauncey, Fuller, Percival, John Francis Burnes, Farragut, Somers, Stoddert, Reno, Farquhar, Thompson, Kennedy, Paul Hamilton, William Jones, Woodbury, S. P. Lee, Nicholas, Young, Zellin, Yarborough, La Vallette, Sloat, Wood, Shirk, Kidder, Selfridge, Marcus, Mervine, Chase, Robert Smith, Mullany, Preston, Lamson, Litchfield, Zane, Wasmuth, Trever, Hulbert, Noa, William B. Preston, Preble, Tillman, Pillsbury, Ford, Truxton, Paul Jones, King, Williamson, Bainbridge, Goff, Barry, Hopkins, Lawrence, Coghlan, Hull, McDonogh, Fahrenholt, Sumner, Perry, Decatur, Converse, Billingsley, Osborne, Bruce, Charles Ausburne, Edsall, MacLeish, Simpson, Bulmer, McCormick, Corry, Melvin, Pope, Peary, Sicard, Pruitt.

## SUBMARINES.

The earlier submarines are being eliminated from the Fleet. The D, F, and G classes have been removed, and the H, K, L, and N classes are for coast defence only. Some of the N class and the single boat of the M class are for sale. The S class is the latest, and of the 50 boats, about 6 have yet to be completed. The first of the class displaces 854–1,062 tons, with 1,200 H.P., but the later boats are 1,200–1,800 H.P. Up to No. 47 the armament is one 4-in. and four 21-in. tubes, but in the later boats the tubes are increased to 5. Twelve torpedoes are carried. The Fleet submarines are T 1, 2, 3 (1919–20), are of 1,106–1,487 tons and 4,000–1,520 H.P., and have one 4-in. and six 21-in. tubes, and carry 16 torpedoes. Their surface speed is estimated at 21 knots. V 1, 2, 3, just completing, are larger; 2,114-2,520 tons and estimated H.P. of 6,500, and they have one 5-in. and one 3-in. A.A., with six 21-in. T.T.

The flotillas are as follows:—

| | | | |
|---|---|---|---|
| H 2 to 3. | 1913. | 358-434 tons, 14-10½ knots | 2 |
| H 4 to 9. | 1918. | 357-454 tons, 12-10½ knots | 6 |
| K 1 to 8. | 1914. | 392 500 tons, 14-9½ knots. | 8*† |
| L 2, 3, 5-9, 11. | 1916-17. | 450 548 tons, 14-10½ knots, 4 T.T.'s | 8 |
| N 1 to 3. | 1918-19. | 357-414 tons 4 T.T. (4 torpedoes) | 3 |

The following are the first line boats:—

| | | | |
|---|---|---|---|
| O 1 to 16. | 1918. | 520-629 tons, 4 T.T., (8 torpedoes), 1 3-in., 14-11 knots | 16 |
| R 1 to 27. | 1918-19. | 569-680 tons, 13½-10½ knots, 4 T.T., (8 torpedoes), 1 3-in. (coastal) | 27 |
| S 1 to 4, 6 to 51. | | Approximately 900-1100 tons, 4-in. guns, 12 21-in. torpedoes carried, with 4 and 5 T.T.'s | 50 |

Fleet submarines:—

| | |
|---|---|
| T 1, 2, 3 completed; V 1, 2, 3 completing. Others of these classes were in the programme, but are not building | 6 |

The list makes a total of 126 boats, of which about 10 have yet be to completed. Three others are projected making 129 boats in all.

* Fitted as mine-layers. † Fitted as seaplane tenders.

# PLANS

OF

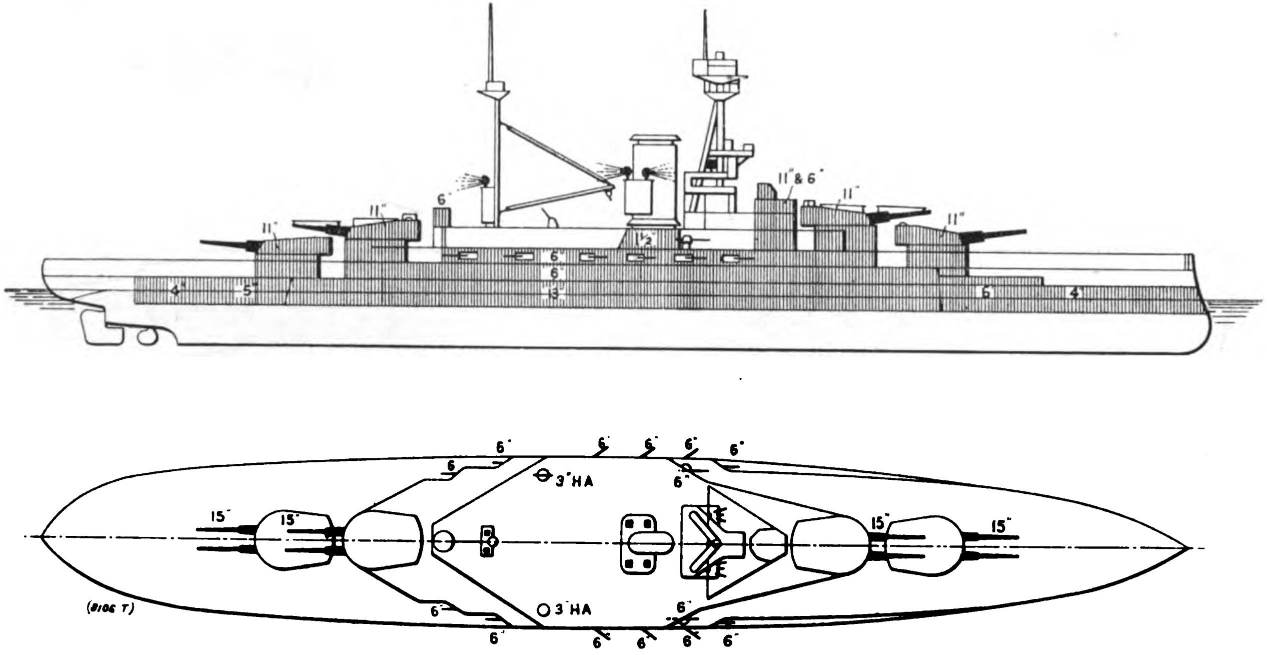
# BRITISH AND FOREIGN WARSHIPS.

2 G

## GREAT BRITAIN

### BATTLESHIPS.

**Royal Sovereign.** **Royal Oak.** **Revenge.** **Resolution.** **Ramillies.**



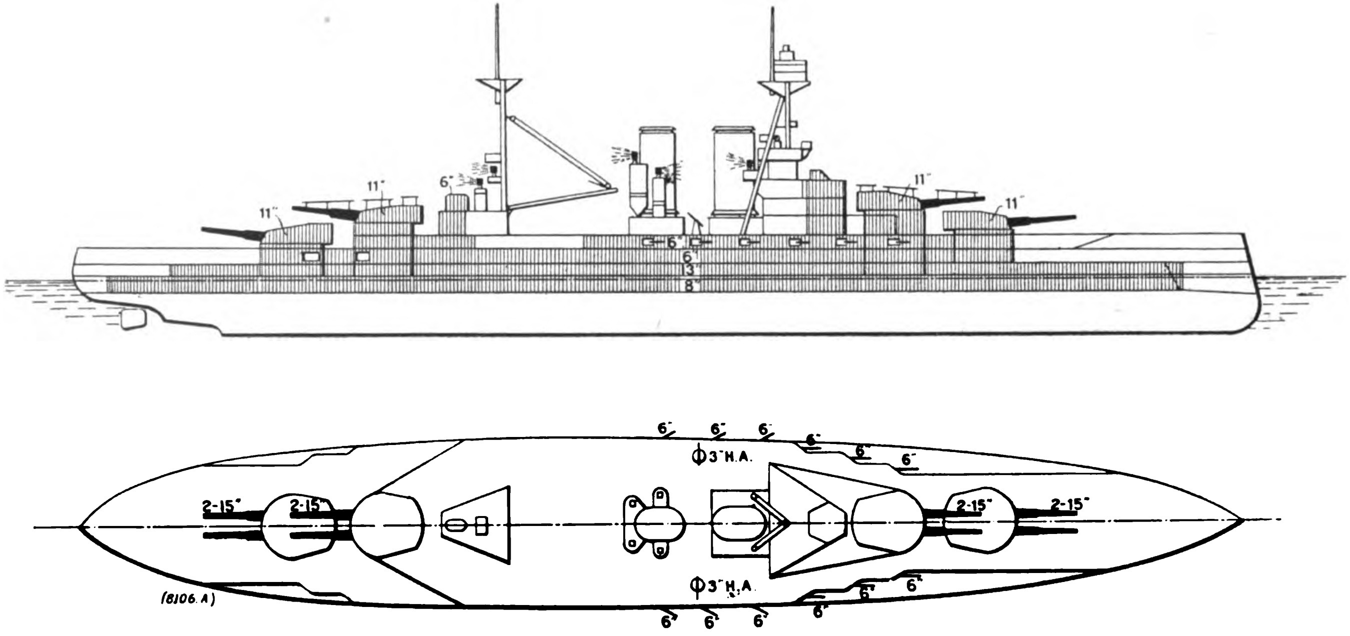
Length (extreme), 620 ft. 6 ins.* ; Length B.P., 580 ft. ; 25,750 tons ; Speed, 23 knots ; Completed, 1916–17.
Armament, 8—15 in. ; 14—6 in. ; 2—3-in. H.A. ; 4—3-pr. ; 5 M ; 10 L.

* Revenge, 624 ft. 6 in.

## GREAT BRITAIN.

### BATTLESHIPS.

**Queen Elizabeth.** **Warspite.** **Barham.** **Valiant.** **Malaya**

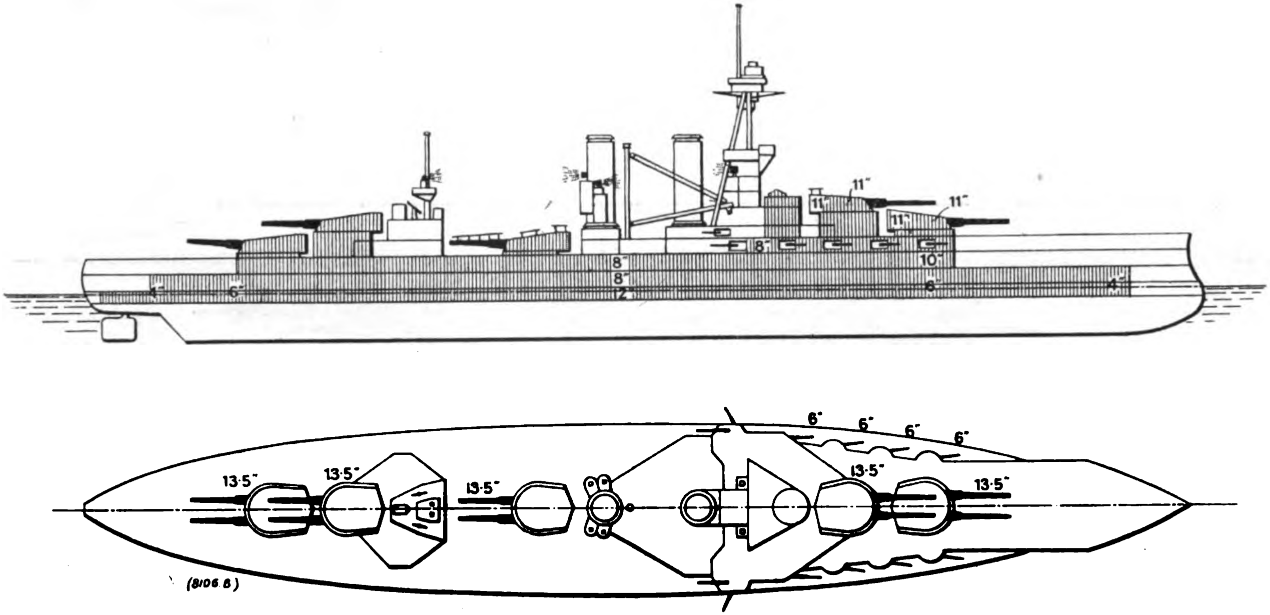


Length (extreme), 639 ft. 9 ins. * ; Length B.P., 580 ft. ; 27,500 tons ; Speed, 25 knots ; Completed, 1915–1916.
Armament, 8—15-in. ; 12—6-in. ; 2—3-in. H.A. ; 4—3-pr. ; 5 M. ; 10 L.
* Barham and Warspite, 643 ft. 9 ins.

# GREAT BRITAIN.

## BATTLESHIPS.

**Iron Duke.** **Marlborough.** **Benbow.** **Emperor of ndia.**



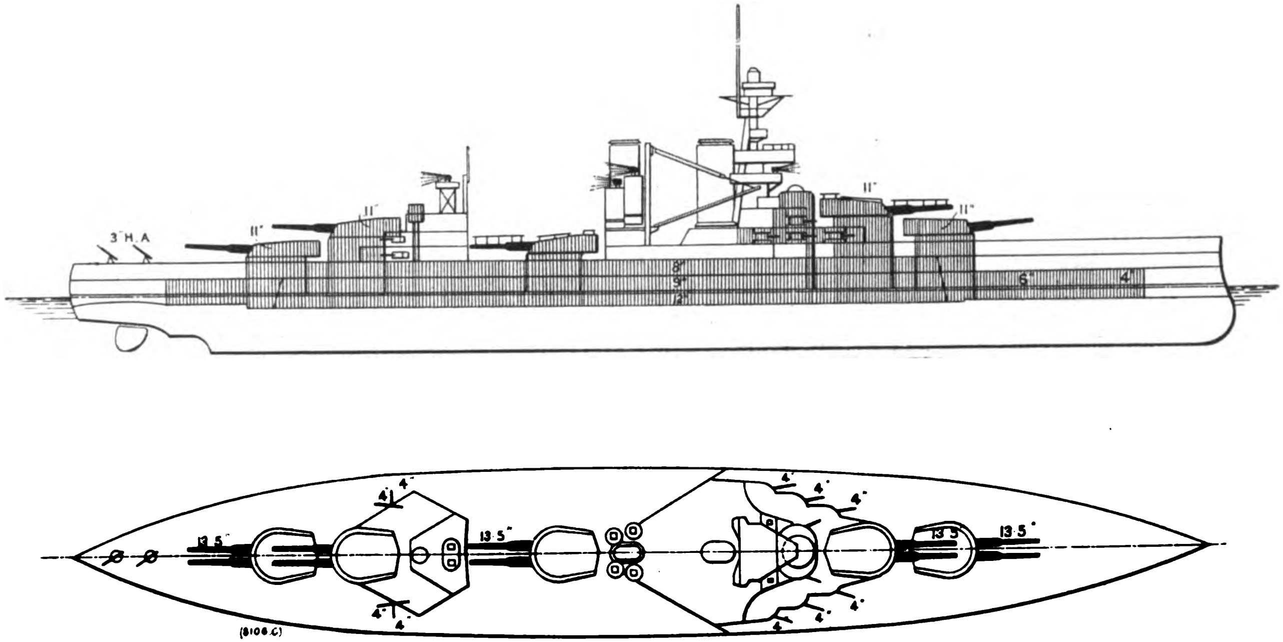
Length (extreme), 623 ft. 9 ins.*; Length B.P., 580 ft.; 25,000 tons; Speed, 21 knots; Completed, 1914.
Armament, 10—13·5-in.; 12—6-in.; 2—3-in. H.A.; 4—3-pr.; 5 M; 10 L.

* Marlborough, 623 ft.; Emperor of India, 622 ft. 9 ins.

## GREAT BRITAIN.

### BATTLESHIPS.

**King George V.** **Ajax.** **Centurion**



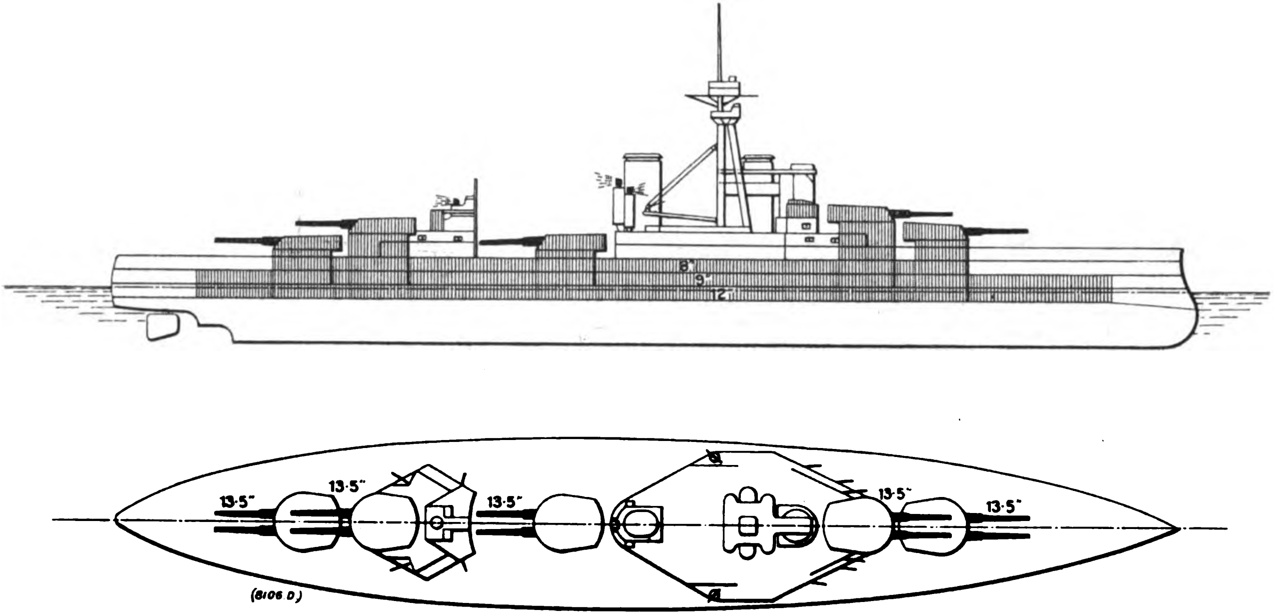
Length (extreme), 597 ft. 9 ins.*; Length B.P., 555 ft.; 23,000 tons; Speed, 21 knots; Completed, 1912-13.
Armament, 10—13·5-in.; 12—4-in.; 4—3-pr.; 2—3-in. H.A.; 5 M.; 10 L.

* King George V., 594 ft. 4 ins.

## GREAT BRITAIN.

### BATTLESHIP.

### Thunderer (Cadets Training Ship)

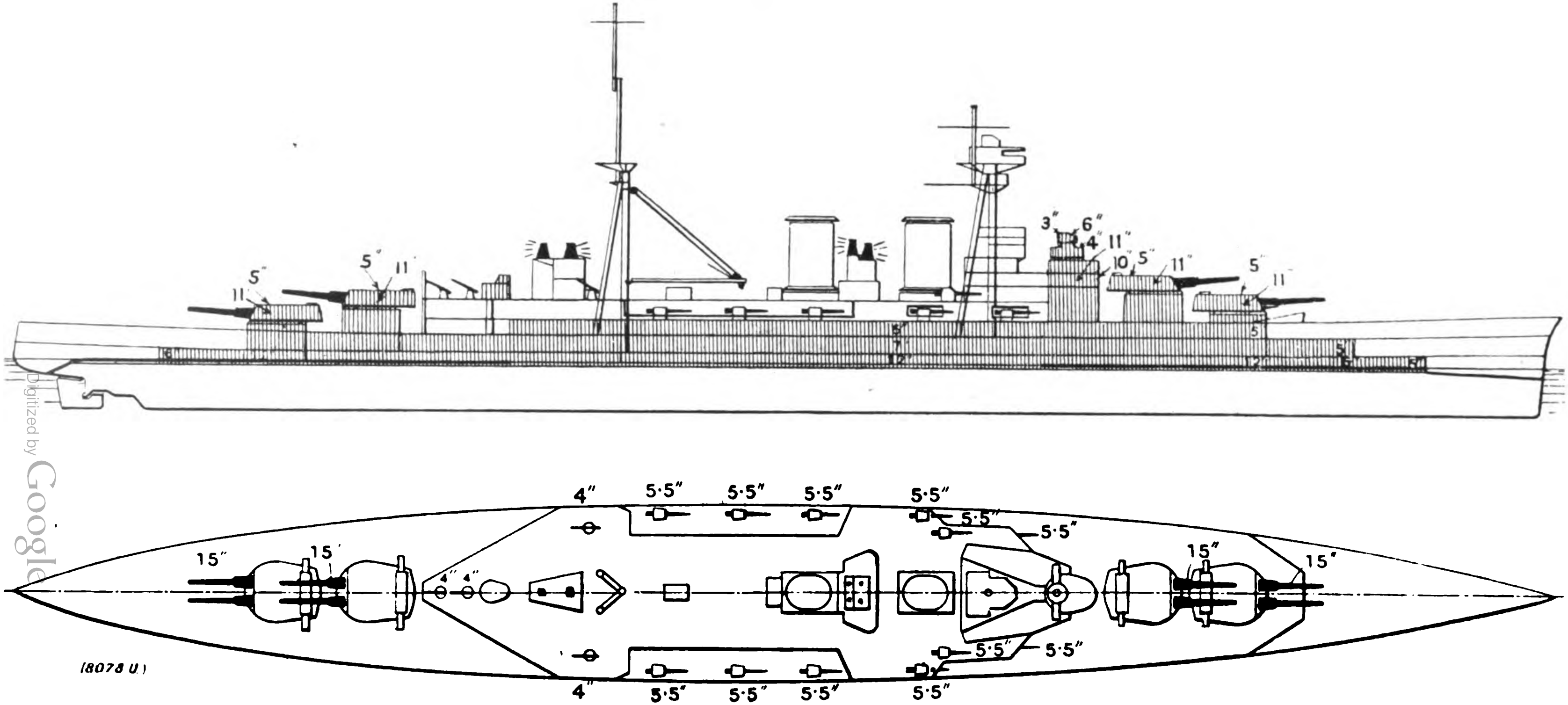


Length (extreme), 581 ft. 2 ins. ; Length B.P., 545 ft. ; 22,500 tons ; Speed, 21 knots ; Completed, 1912.
Armament, 10—13·5-in. ; 8—4-in. ; 1–3-in. H.A. ; 4 3-pr. ; 5 M. ; 10 L.

## GREAT BRITAIN.

### BATTLE-CRUISER.

### Hood.



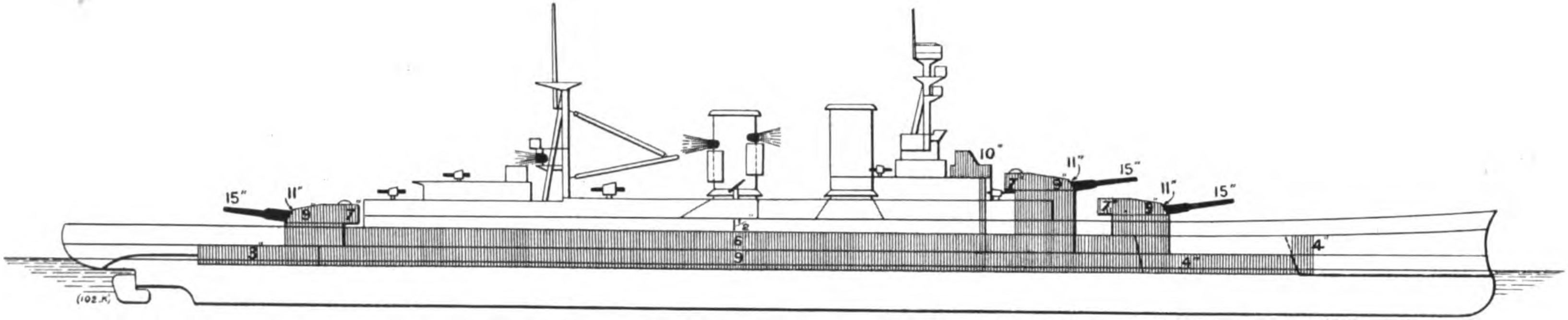
Length (extreme), 860 ft. 7 ins.; Length B.P., 810 ft.; 41,200 tons; Speed, 31* knots; Completed, 1920.
Armament, 8—15-in.; 12—5·5-in.; 4—4-in. H.A.; 4—3-pdr.

* Trials at 44,600 tons, 31·89 knots with 151,000 S.H.P.

# GREAT BRITAIN.

## BATTLE-CRUISERS.

**Repulse.** **Renown.**



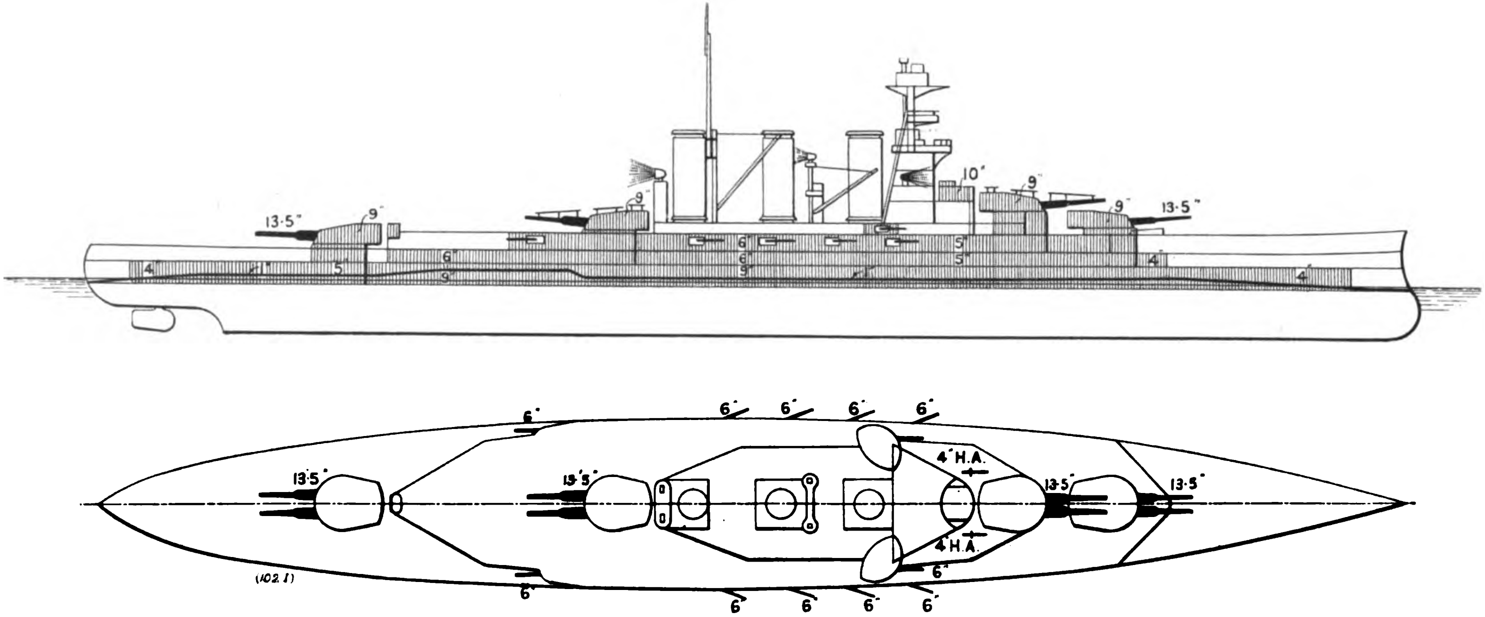
Length (extreme), 794 ft. 2 ins.; Length, B.P., 750 ft.; 26,500 tons; Speed, 31·5 knots; Completed, 1916.
Armament, 6—15-in.; 17—4-in.; 4—3-pr.; 2—3-in. H.A.; 5 M.; 10 L.

**Note.**—Repulse originally had a 6-in. main belt, but was re-armoured in 1920–21. Re-armouring of the Renown is allowed for by Chapter II., Part 3, Section (*d*) 2. of the Treaty of Washington.

## GREAT BRITAIN.

### BATTLE-CRUISER

**Tiger.**

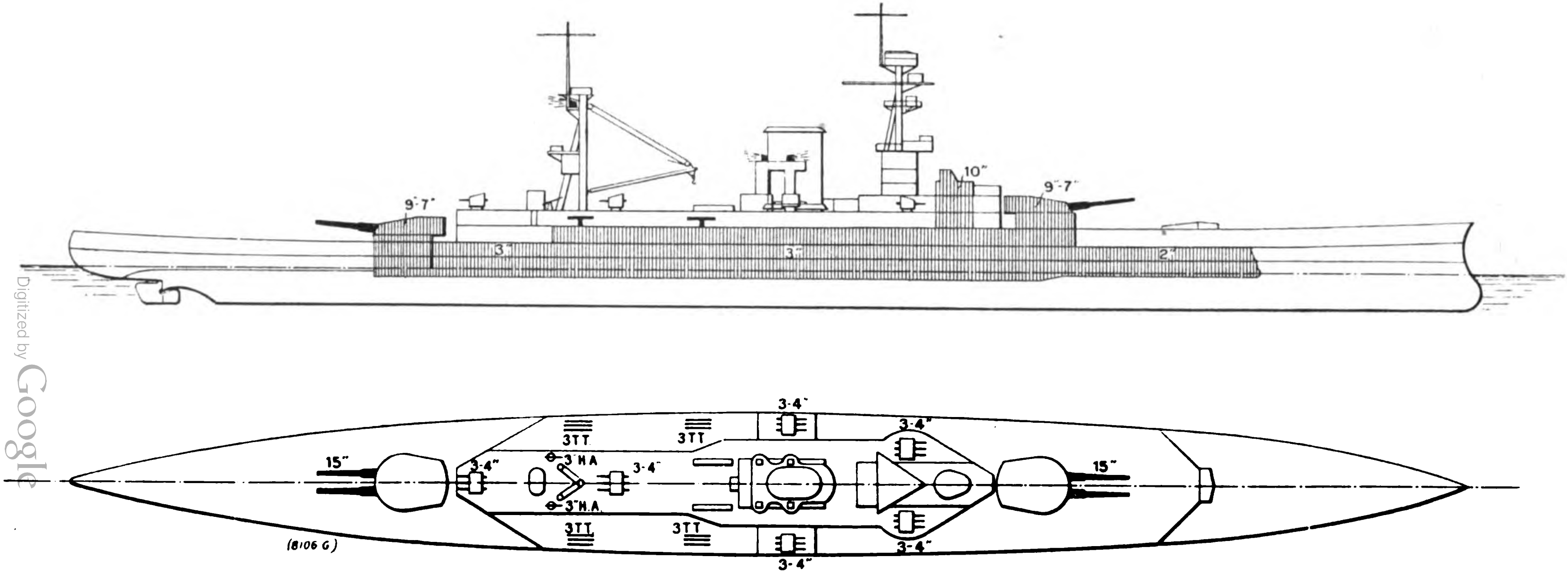


Length (extreme). 704 ft. ; Length B.P., 660 ft. ; 28,500 tons ; Speed, 30 knots ; Completed, 1914.
Armament, 8—13·5-in. ; 12—6-in. ; 4—3-pr.; 4—4-in. ; 5 M. ; 10 L.

## GREAT BRITAIN.

### LARGE LIGHT CRUISERS.

**Courageous.** **Glorious.**



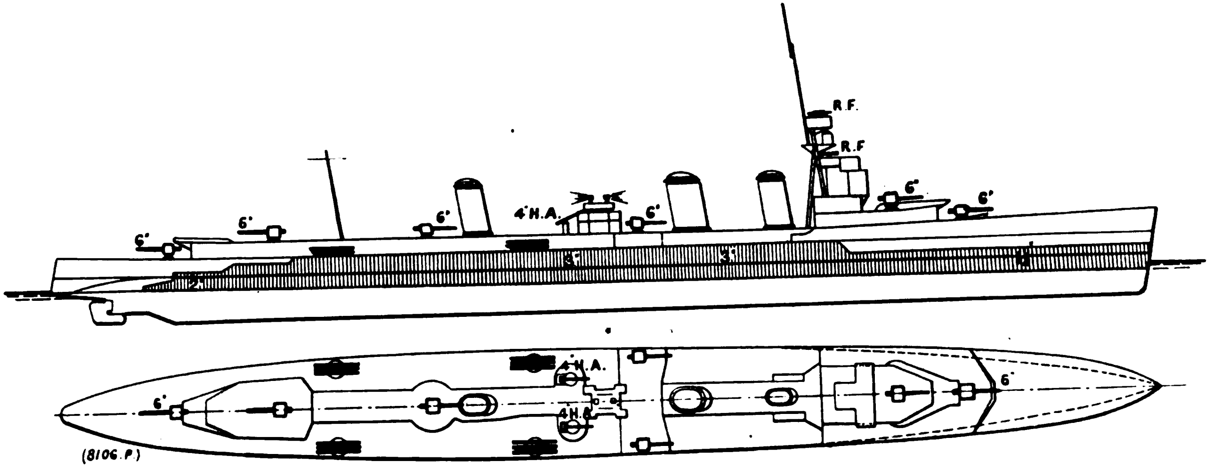
Length (extreme), 786 ft. 3 ins.; Length B.P., 735 ft.; 18,600 tons; Speed, 31 knots; Completed, 1917.
Armament, 4—15-in.; 18—4-in.; 2—3-in. H.A.; 4—3-pr.; 5 M.; 10 L.

NOTE.—These vessels are to be reconstructed as Aircraft Carriers.

## GREAT BRITAIN.

### LIGHT CRUISERS.

**Emerald.** **Enterprise.**

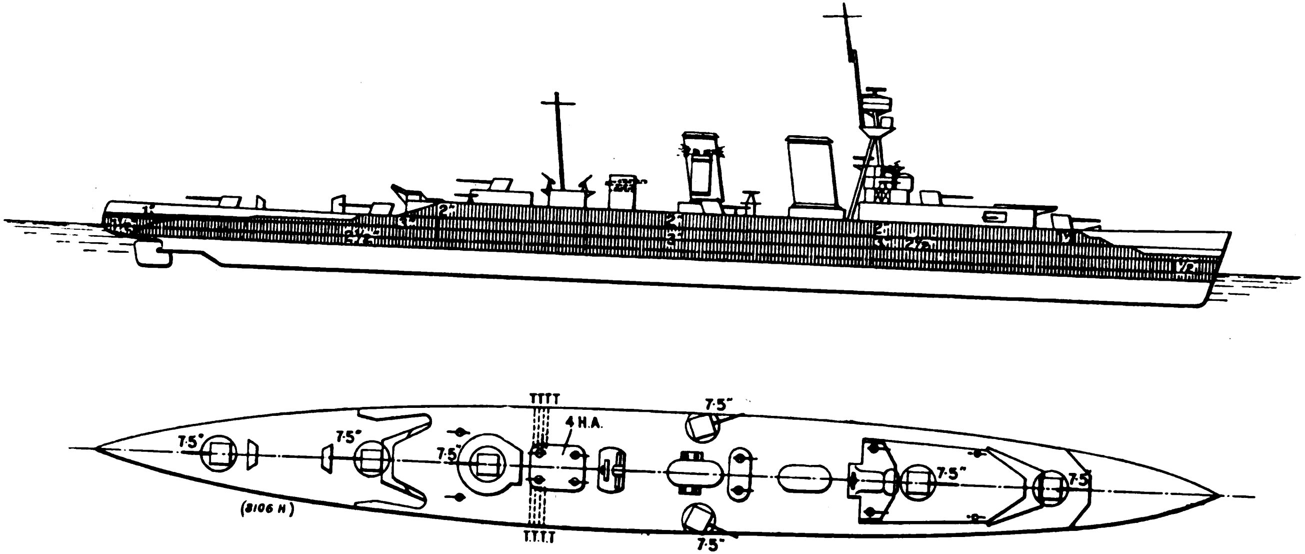


Length (extreme), 570 ft. ; Length B.P., 535 ft. ; 7,550 tons ; Speed, 33 knots.
Armament, 7—6-in. ; 2—4-in. H.A. ; 4—3-pr. ; 2—2-pr. Pom Pom. ; 1 M.

## GREAT BRITAIN.

### LIGHT CRUISERS.

**Effingham.** **Hawkins.** **Frobisher.**

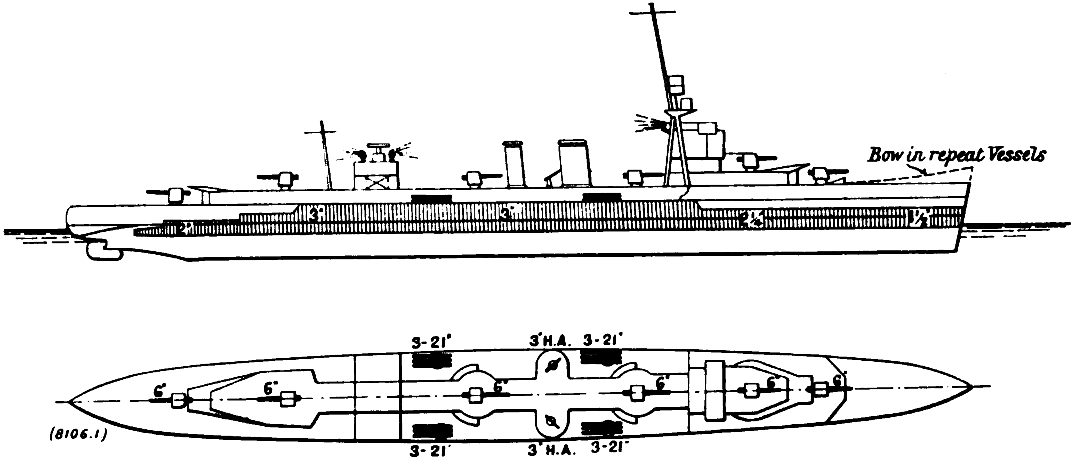


Length (extreme), 605 ft. ; Length B.P., 565 ft. ; 9,750 tons ; Speed, 30 knots.
Armament, 7—7·5-in. ; 3—4-in. H.A. ; 2—2-pr. ; 2 M. ; 8 L.

## GREAT BRITAIN.

### LIGHT CRUISERS. D CLASS.

**Despatch.*** **Diomede.*** **Danae.** **Dauntless.** **Dragon.** **Delhi.*** **Dunedin.** **Durban.***



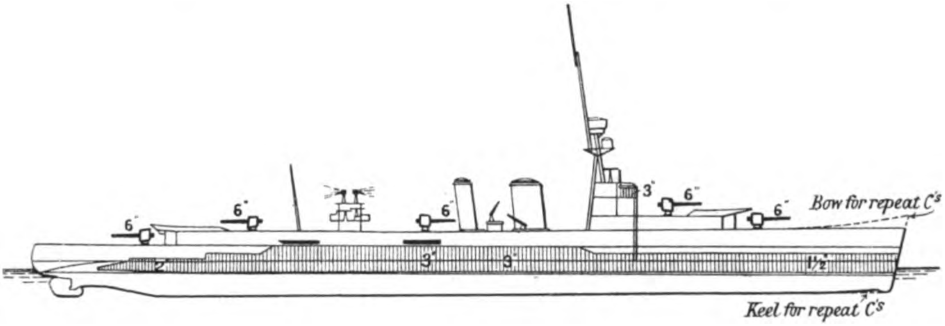
Length, 445 ft.; 4,750 tons †; Speed, 29 knots;
Armament, 6—6 in.; 2—3-in. H.A. ‡; 2 M.

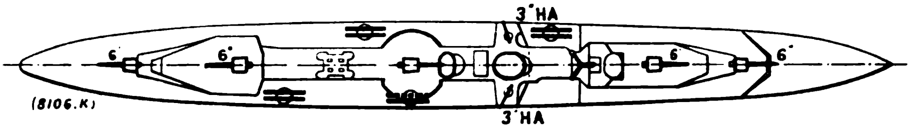
* Repeat vessels.
† Despatch and Durban are 4,765 tons.
‡ Despatch, Diomede, Durban, and Delhi have 2—4-in. H.A. guns.

## GREAT BRITAIN.

### LIGHT CRUISERS.

**Ceres.** ***Cairo.** **Curacoa.** **Cape Town.** **Curlew.** **Carlisle.** **Cardiff.** **Colombo.** **Coventry.** **Calcutta.**

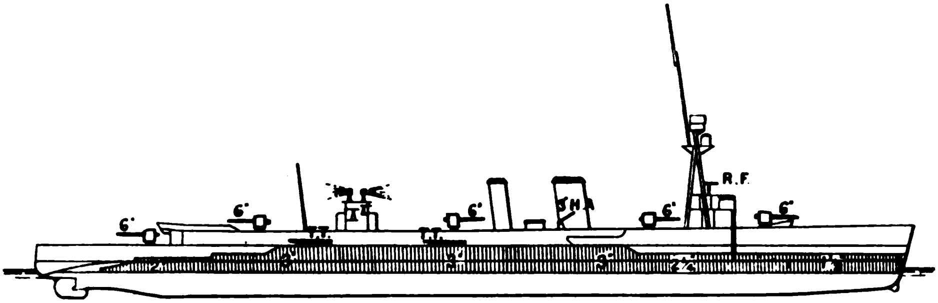


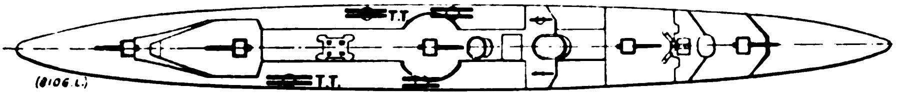


Length (extreme), 450 ft. (451 ft. 6 ins. Repeat Vessels); Length B.P., 425 ft.; 4,190 tons; Speed, 29 knots; Completed, 1917-18 (Repeat Vessels, 1918-22).
Armament, 5—6-in.; 2—3-in. H.A.; 4—3-pr.; 2—2-pr. Pom Poms; 4 above-water D.R. torpedo tubes.
* Repeat vessels.

### LIGHT CRUISERS.

**Caledon.** ***Centaur.** **Calypso.** **Concord.** **Caradoc.**





* These Plans apply to the above-named ships, but there are differences in detail, as stated.

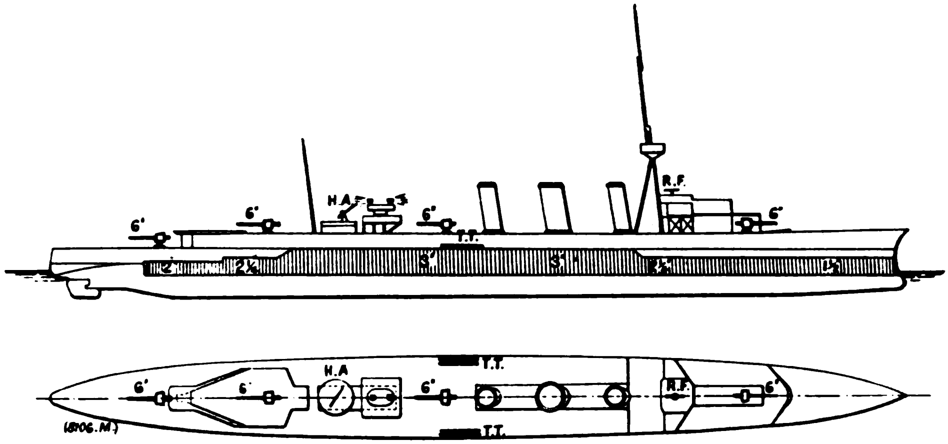
**Caledon**
**Calypso**
**Caradoc**
} Length (extreme), 450 ft.; Length B.P., 425 ft.; 4120 tons; Speed, 29 knots; Completed, 1917.
Armament, 5—6-in.; 2—3-in. H.A.; 4—3-pr.; 2—2-pr. Pom Poms; 2 M.; 8 L.; and 4 above-water D.R. torpedo tubes.

**Centaur**
**Concord**
} Length (extreme), 446 ft.; Length B.P., 420 ft.; 3,750 tons; Speed, 29 knots; Completed, 1916.
Armament, 5—6-in.; 2—3-in. H.A.; 2—3-pr.; 2—2-pr. Pom Poms; 2 M.; 4 L.; and 2 submerged torpedo tubes.

## GREAT BRITAIN.

### LIGHT CRUISERS.

**Conquest.** **Carysfort.** **Cleopatra.** **Comus.**

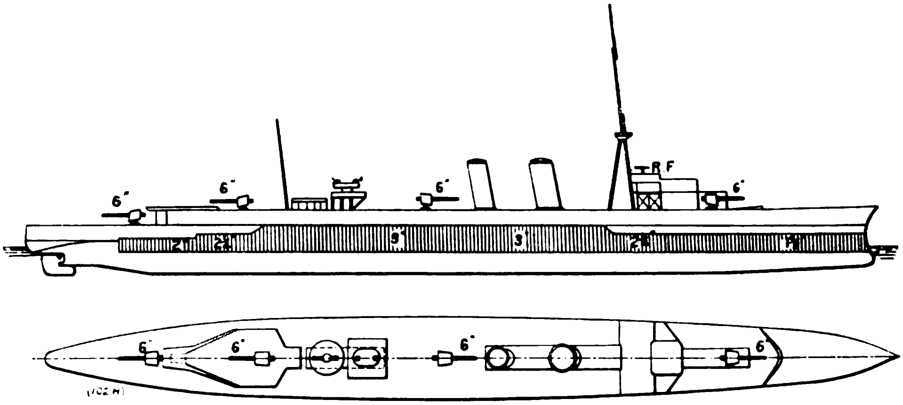


**Conquest**
**Carysfort**
**Cleopatra**
**Comus**

Length (extreme), 446 ft.; Length B.P., 420 ft.; 3,750 tons; Speed, 29 knots; Completed, 1915.
Armament, 4—6-in; 2—3-in H.A.; 2 - 2-pr. Pom Poms; 1 M.; 8 L.; 2 above water D.R. torpedo tubes.
(Comus and Carysfort have 4—3-pr.)

### LIGHT CRUISERS.

**Cambrian.** **Canterbury.** **Constance.** **Castor.** **Champion.** **Calliope.**



Length (extreme), 446 ft.; Length B.P., 420 ft.; 3,750 tons; Speed, 29 knots; Completed, 1915.

**Cambrian**
**Canterbury**
**Constance**
**Castor**

Armament, 4—6-in.; 2—3-in. H.A.; 4—3-pr.; 2—2-pr. Pom Poms; 1 M.; 8 L.; 2 submerged torpedo tubes

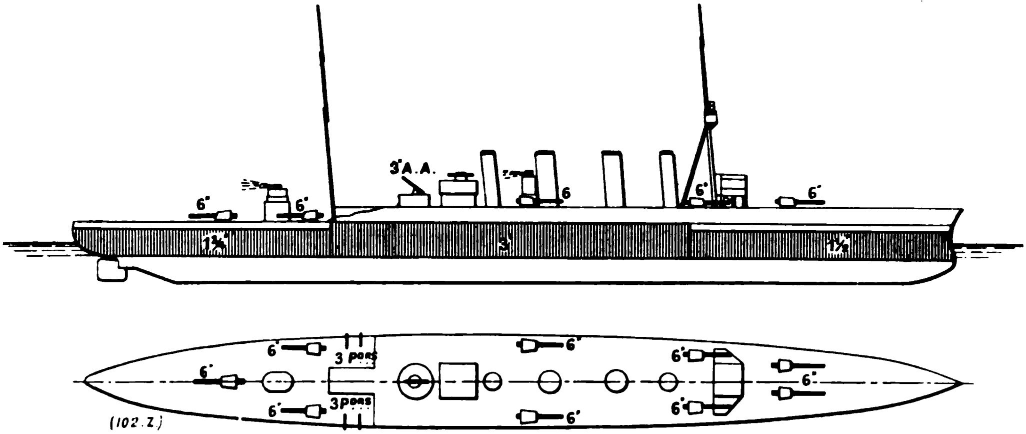
**Champion** Armament, 4—6-in.; 1—4-in. H.A.; 2—2-pr. Pom Poms; 1 M.; 8 L.; 2 submerged torpedo tubes.

**Calliope** Armament, 4—6-in.; 2—3-in. H.A.; 4—3-pr. 2—2-pr. Pom Poms; 1 M.; 8 L.; 2 submerged torpedo tubes.

## GREAT BRITAIN.

### LIGHT CRUISERS.

**Birmingham.** **Lowestoft.** ***Southampton.** **Dublin.**



Length (extreme), 457 ft. ; Length B.P., 430 ft. ; 5,440 tons ; Speed, 25½ knots ; Completed, 1914.
5,400 tons Southampton and Dublin ; Completed, 1912-1313.

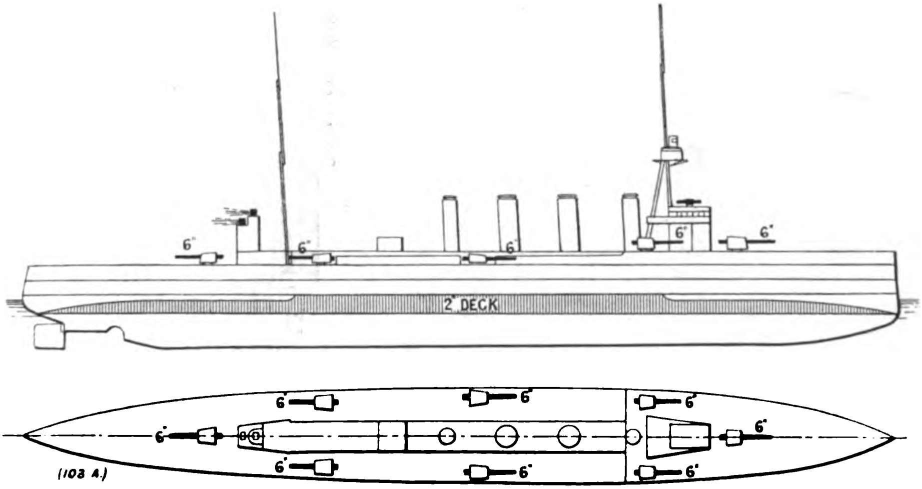
**Birmingham** } 9—6-in. ; 1—3-in. A.A. ; 4—3-pr. ; 2 M. ; 8 L. ; 2 submerged torpedo tubes.
**Lowestoft** }

**Southampton** } 8—6-in. ; 1—3-in. A.A. ; 4—3-pr. ; 2 M. ; 8 L. ; 2 submerged torpedo tubes.
**Dublin** }

* NOTE.—Southampton and Dublin have only one six-inch gun forward instead of two as for the other two vessels.

### LIGHT CRUISERS.

**Weymouth.** **Dartmouth.** **Yarmouth.**



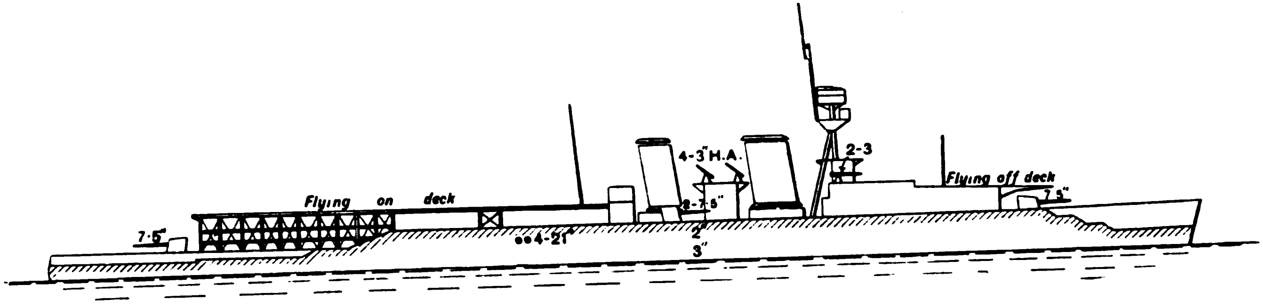
Length (extreme), 453 ft. ; Length B.P., 430 ft. ; 5,250 tons ; Speed, 25½ knots ; Completed, 1911-12.
Armament, 8—6-in. ; 1—3-in A.A. ; 4—3-pr. ; 2 M. ; 8 L. ; 2 submerged torpedo tubes.

## GREAT BRITAIN.

### LIGHT CRUISER.

**Vindictive.**

**Aircraft Carrier.**

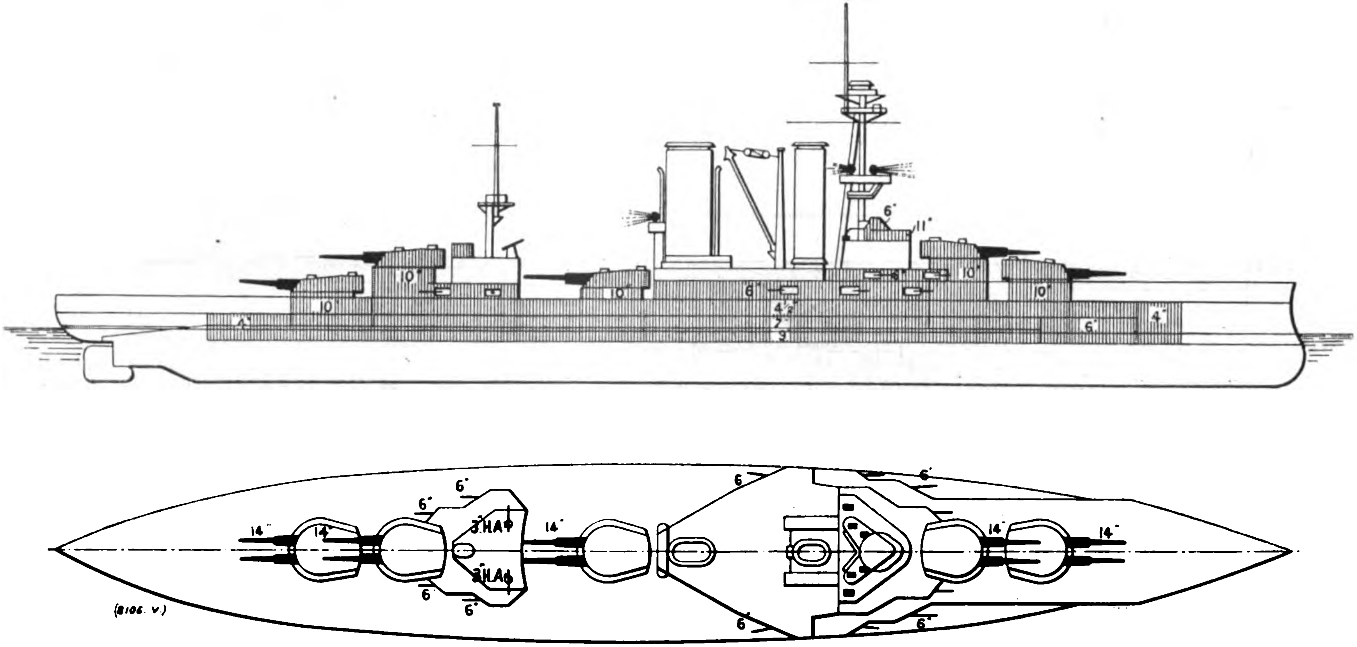


Length, 565 ft. ; 9750 tons ; Speed, 28·75 knots ; Completed, 1918 ;
Armament, 4—7·5-in. ; 4—3-in. ; 4—3-in. H.A. ; 1—12-pr. ; 13 M.

# CHILE.

## BATTLESHIP.

**Almirante Latorre (*formerly* H.M.S. Canada).**

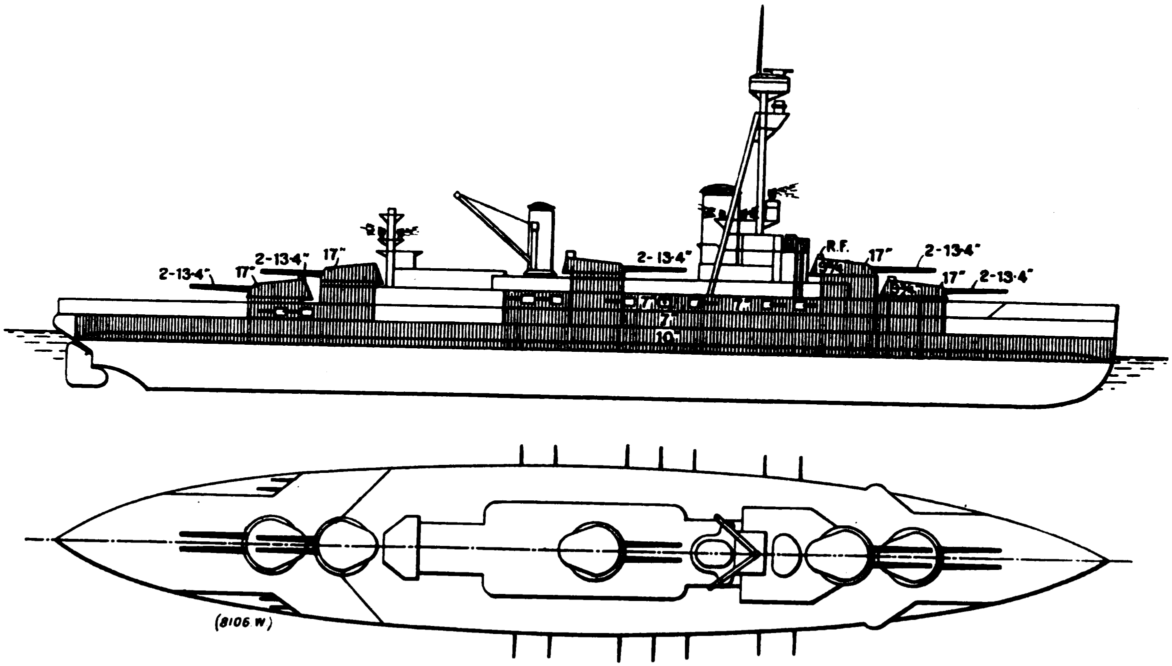


Length (extreme), 661 ft. ; Length B.P., 625 ft. ; 28,000 tons ; Speed, 23 knots ; Completed, 1915.
Armament, 10—14-in. ; 14—6-in. ; 2—3-in. ; and smaller.

# FRANCE.

## BATTLESHIPS.

**Bretagne.** **Lorraine.** **Provence.**

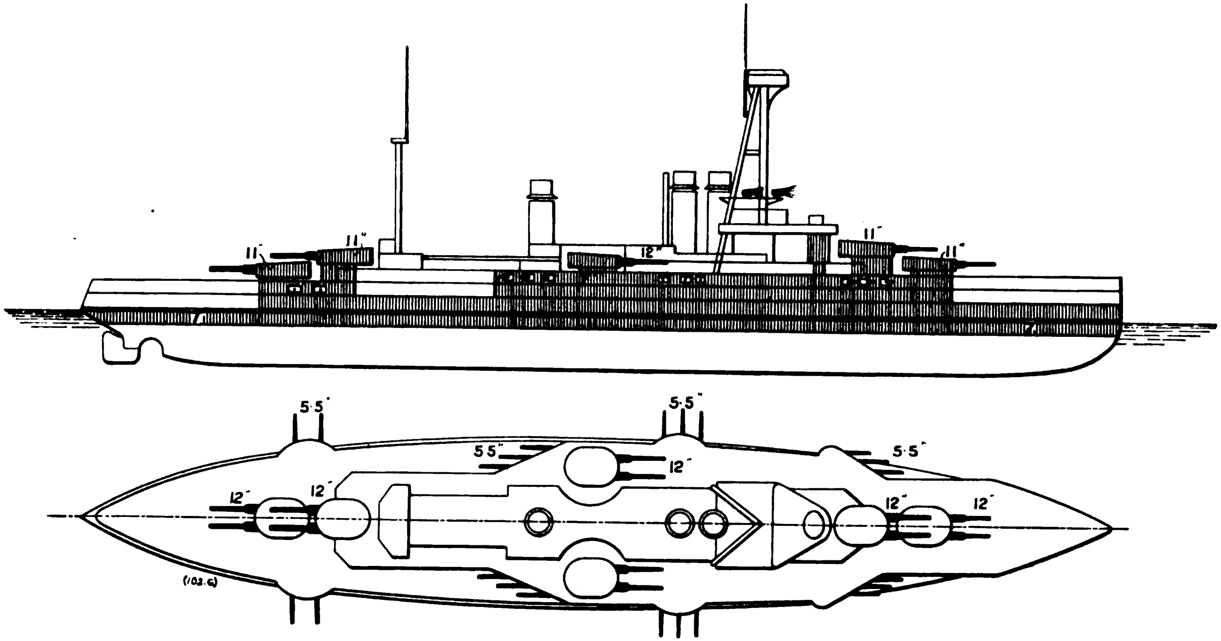


Length (extreme), 544 ft. 6 ins.; 23,177 tons; Speed, 20 knots; Completed, 1915–16; Reconstructed, 1919–20.
Armament, 10—13·4-in.; 18—5·5-in.; 4—14-pr. A.A.; Bretagne has 2—14-pr. A.A.
NOTE.—Bretagne as above, Provence and Lorraine have a main topmast rigged.

# FRANCE.

## BATTLESHIPS.

**Jean Bart.** **Courbet.** **Paris.**



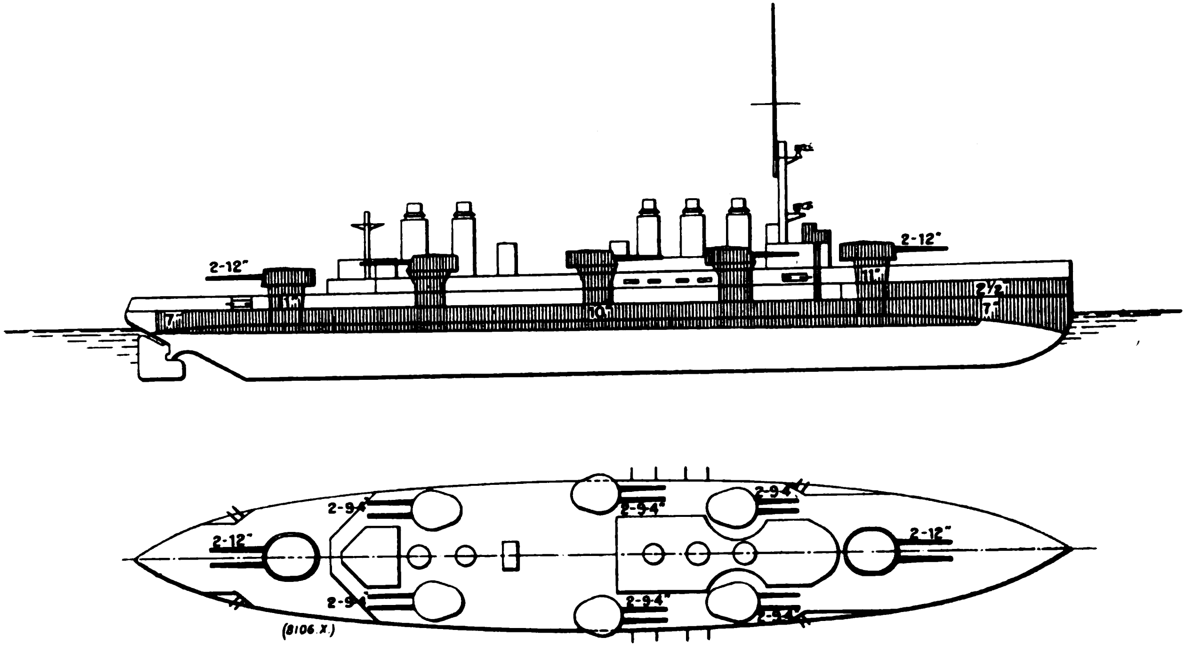
Length (extreme), 544 ft. ; Length B.P., 541 ft. 4 ins. ; 23,500 tons ; Speed, 20 knots ; Completed, 1913–14. Large alterations, 1924. Armament, 12—12-in. ; 22—5·5-in. ; 4—3-pr.

NOTE.—Courbet and Jean Bart have only one large funnel forward instead of the two smaller ones in Paris.

# FRANCE.

## BATTLESHIPS.

**Condorcet.** **Diderot.** **Voltaire.**

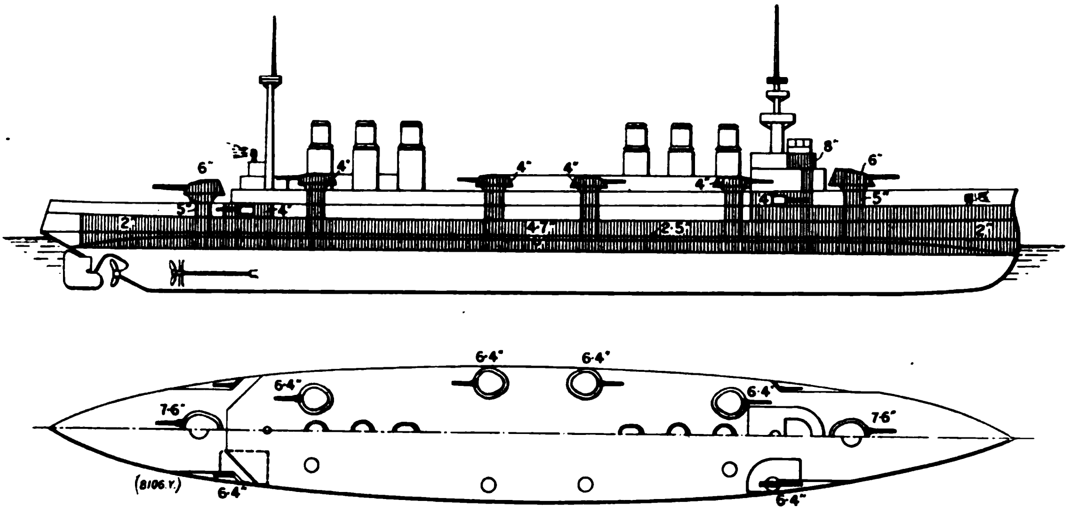


Length (extreme), 481 ft. ; Length W.L., 475 ft. 9 ins. ; Speed, 19¼ knots ; 18,600 tons ; Completed, 1911.
Armament, 4—12-in. ; 12—9·4-in. ; 12—3-in. ; 2—3-pr.

# FRANCE.

## ARMOURED CRUISERS.

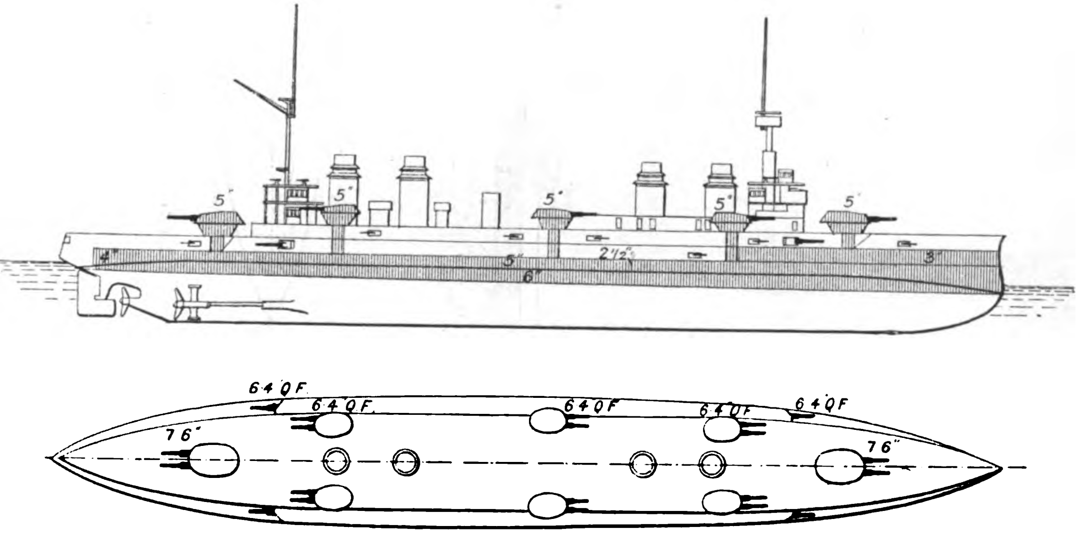
**Ernest Renan.** **Jules Michelet.**



Length, 515 ft. and 489 ft. ; 13,500 tons and 13,100 tons ; Speed, 23 knots and 22 knots ; Completed, 1909 and 1908 ; Armament, 4—7·6-in., 12—6·5-in. ; and smaller.

## ARMOURED CRUISERS.

**Jules Ferry.** **Victor Hugo.**



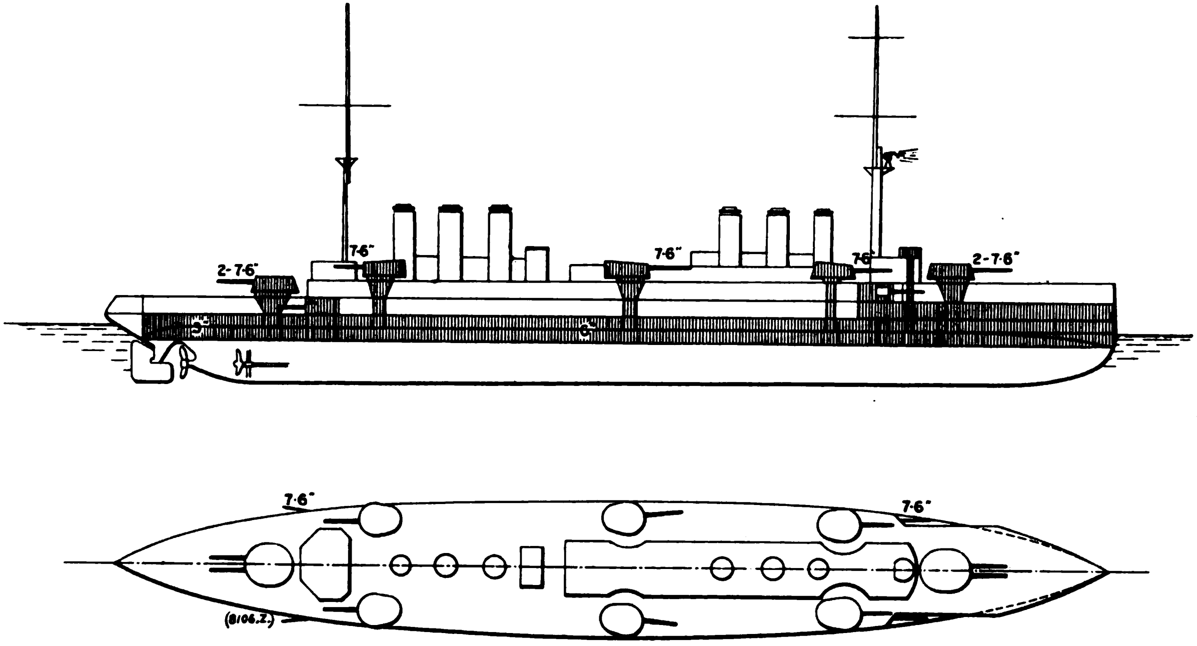
Length, 487 ft. and 480 ft. 6-ins. ; 12,351 and 13,108 tons ; Speed, 22 knots ; Completed, 1906-1907. Armament, 4—7·6-in., 16 *—6·4-in. ; 24 smaller.

* Jules Ferry has 14—6·4-in.

## FRANCE.

### ARMOURED CRUISERS.

**Edgar Quinet.** **Waldeck Rousseau.**

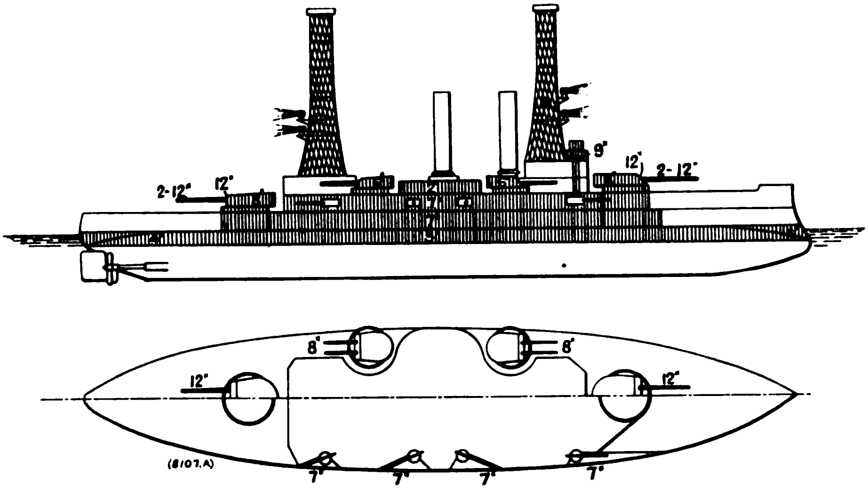


Length (extreme), 521 ft. 4 ins. ; Length W.L., 515 ft. ; Speed, 23 knots ; 13,990 tons ; Completed, 1911.
Armament, 14—7·6-in. ; 14—9-pr. ; and smaller.

## GREECE.

### BATTLESHIPS.

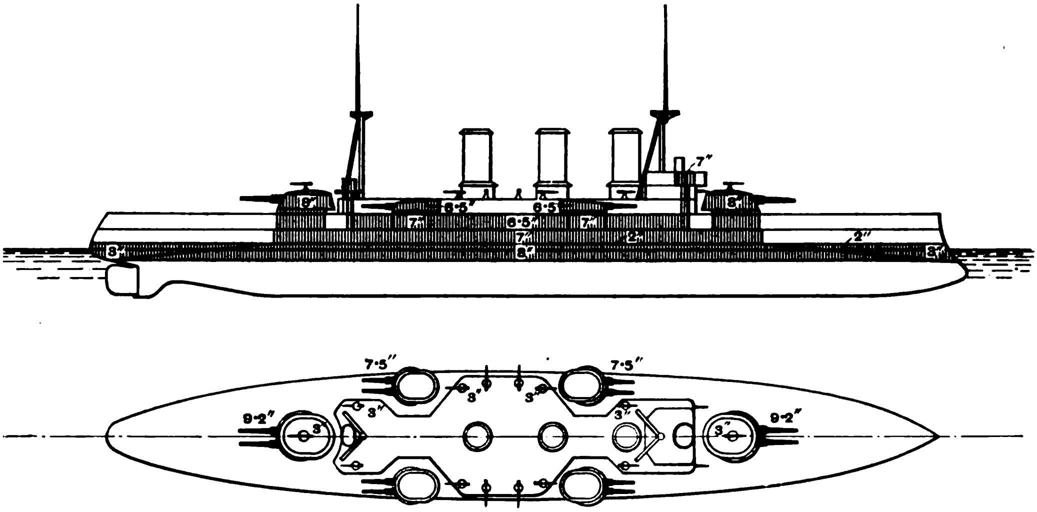
**Lemnos** (*ex* **Idaho**). **Kilkis** (*ex* **Mississippi**).



Length, 375 ft. ; 13,000 tons ; Speed, 17·1 knots ; Completed, 1908.
Armament, 4—12-in. ; 8—8-in. ; 8—7-in. ; 12—3-in. ; 14 smaller.

### ARMOURED CRUISER.

**Giorgios Averoff.**

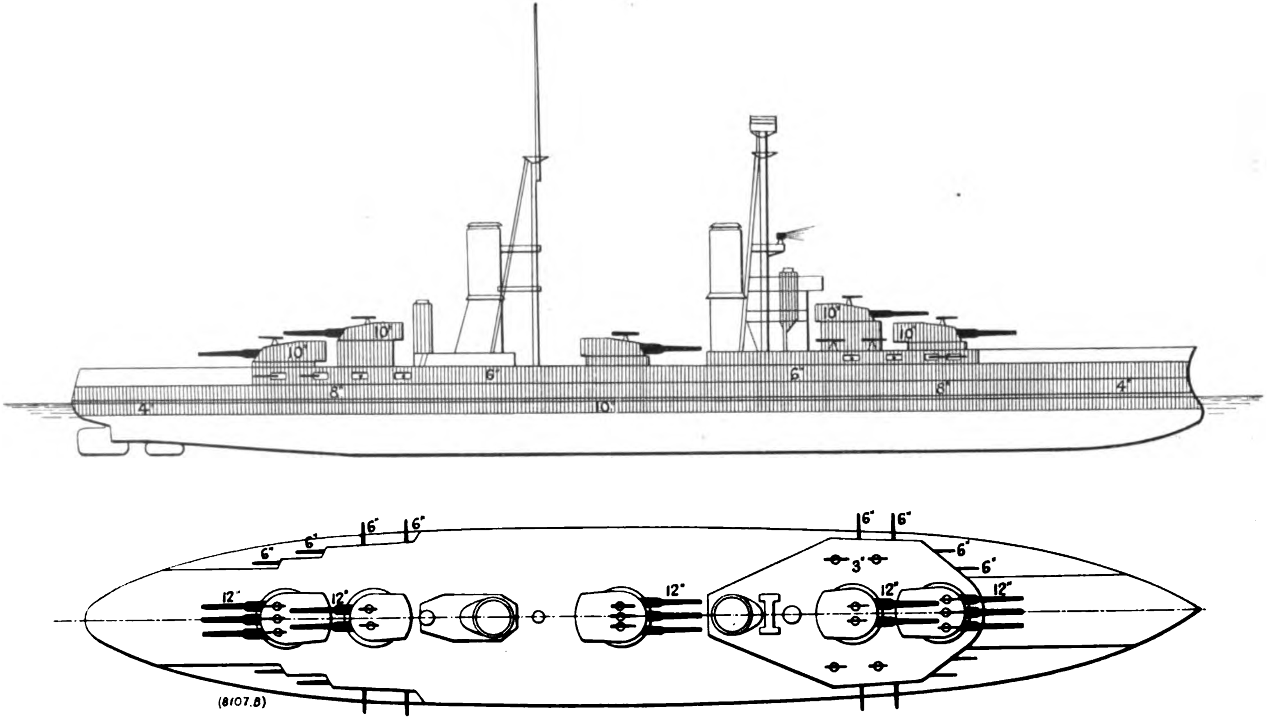


Length, 429 ft. 9 ins. ; 9,956 tons ; Speed, 24 knots ; Completed, 1911.
Armament, 4—9·2-in. ; 8—7·5-in. ; 16—3-in. ; 8 smaller.

# ITALY.

## BATTLESHIPS.

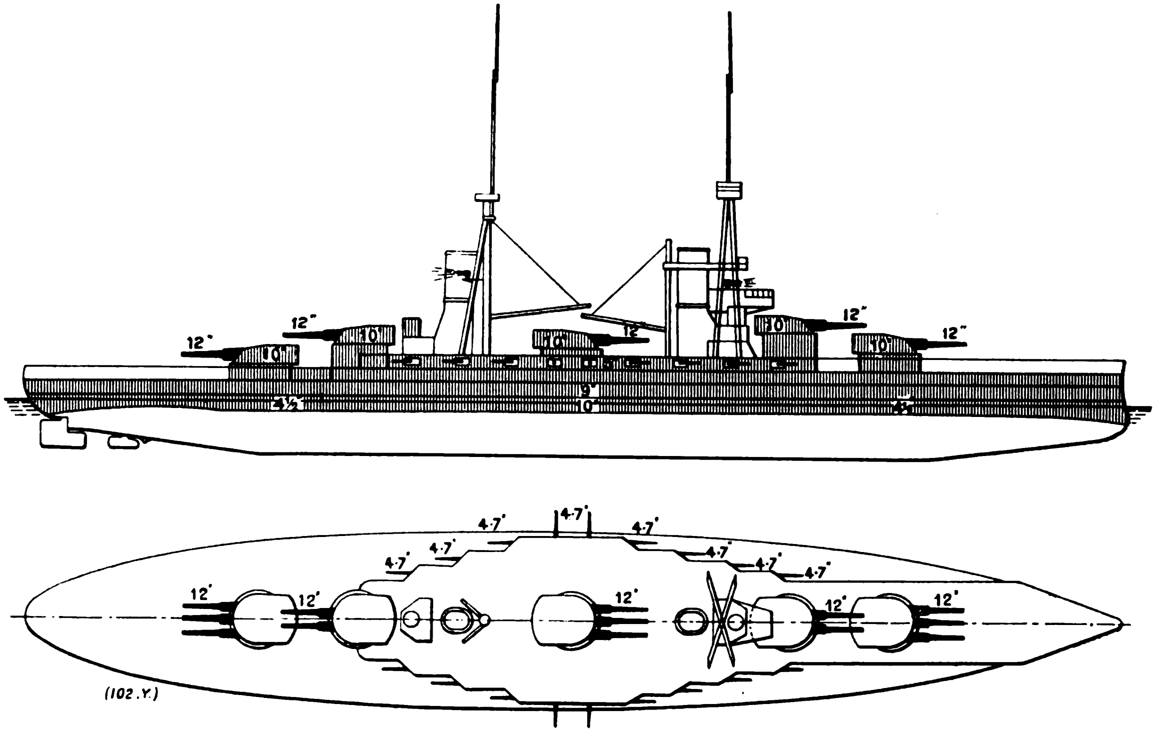
**Andrea Doria.** **Caio Duilio.**



Length (extreme), 575 ft. 9 ins.; Length B.P., 554 ft. 4 ins.; Speed, 22 knots; Completed, 1915.
Armament, 13—12-in.; 16—6-in.; 13—14 pr.; 6—14 pr. H.A.; 2 M.; 4 L.

## ITALY.

**Conte di Cavour.** **Guilio Cesare.**

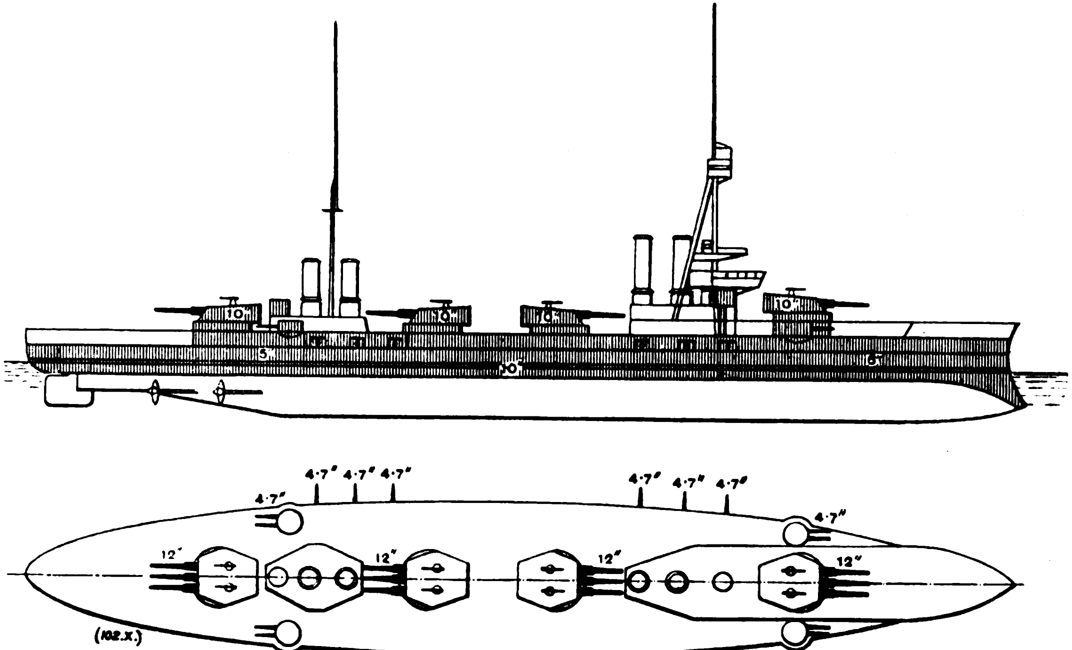


Length (extreme), 575 ft. 9 ins. ; Length B.P., 554 ft. 4 ins. ; Speed, 22 knots ; 22,023 tons ; Completed, 1914-1915.
Armament, 13—12 in. ; 18 - 4·7 in. ; 13—14 pr. ; 6—14 pr. H.A.

# ITALY.

## BATTLESHIP.

### Dante Alighieri.

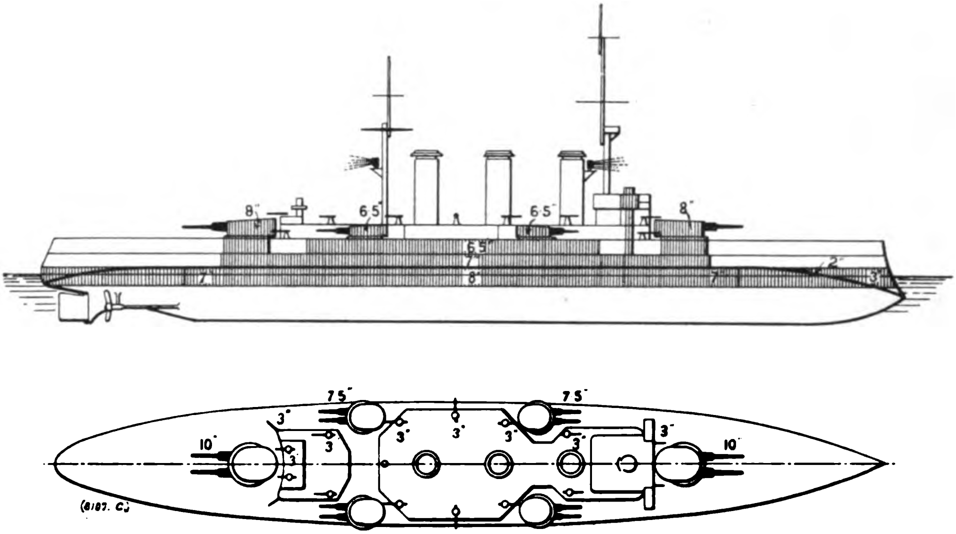


Length (extreme), 549 ft. 6 ins. ; Length B.P., 519 ft. 8½ ins. ; Speed, 23 knots ; 19,400 tons ; Completed, 1912.
Armament, 12—12-in. ; 20—4·7-in. ; 12—14-pr. ; and 6—14-pr. H.A.

# ITALY.

## ARMOURED CRUISER.

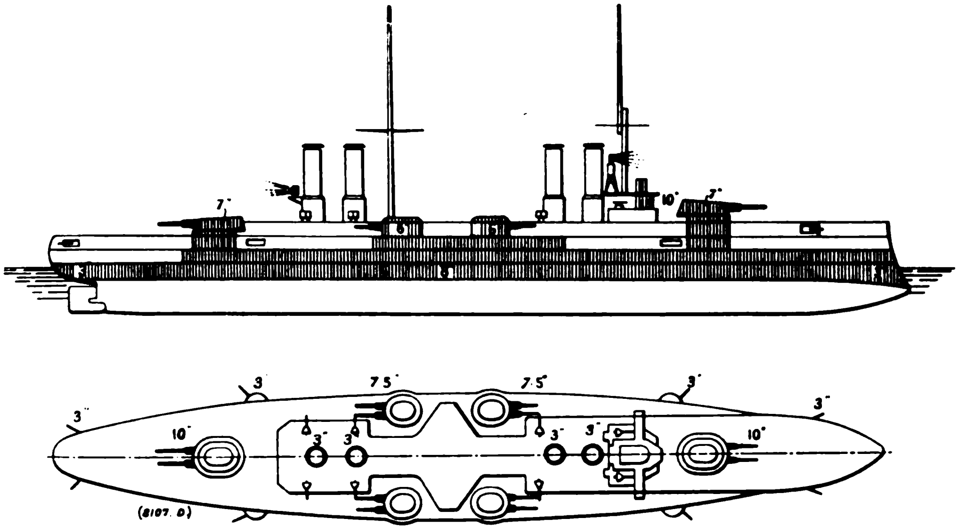
### Pisa.



Length (extreme), 460 ft. 11 ins. ; Length B.P., 426 ft. 6 ins. ; Speed, 23 knots ; 10,600 tons ; Completed, 1908.
Armament, 4—10-in. ; 8—7·5-in. ; 14—14-pr. ; 6—14-pr. H.A.

## ARMOURED CRUISERS.

### S. Giorgio. S. Marco.

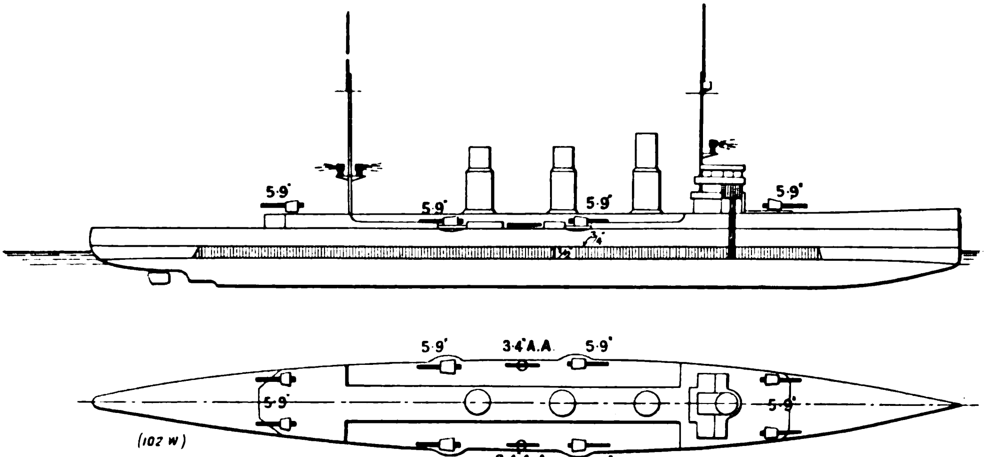


Length (extreme), 462 ft. 2 ins. ; Length B.P., 420 ft. 10 ins. ;
Speed, 22·5 and 23 knots ; 10,800 and 10,000 tons ; Completed, 1910.
Armament, 4—10-in. ; 8—7·5-in. ; 10—14-pr. ; 6–14-pr. H.A.

# ITALY.

## LIGHT CRUISER.

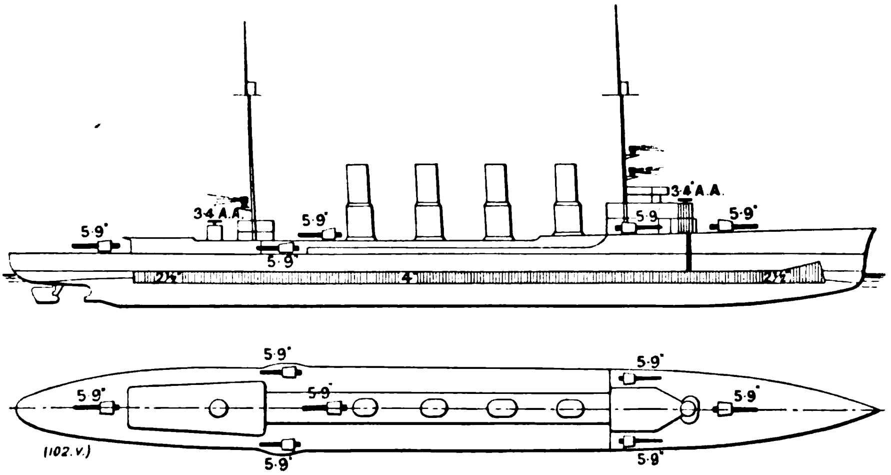
### Bari (*ex-German* Pillau).



Length (extreme), 441 ft. ; Length B.P., 403 ft. ; 4,320 tons ; Speed, 27·5 knots ; Completed, 1914.
Armament, 8—5·9.in. ; 3—3·4-in. A.A. ; 2 above-water torpedo tubes (19·7-in. torpedoes). Can carry 120 mines.

## LIGHT CRUISER.

### Taranto (*ex-German* Strassburg).

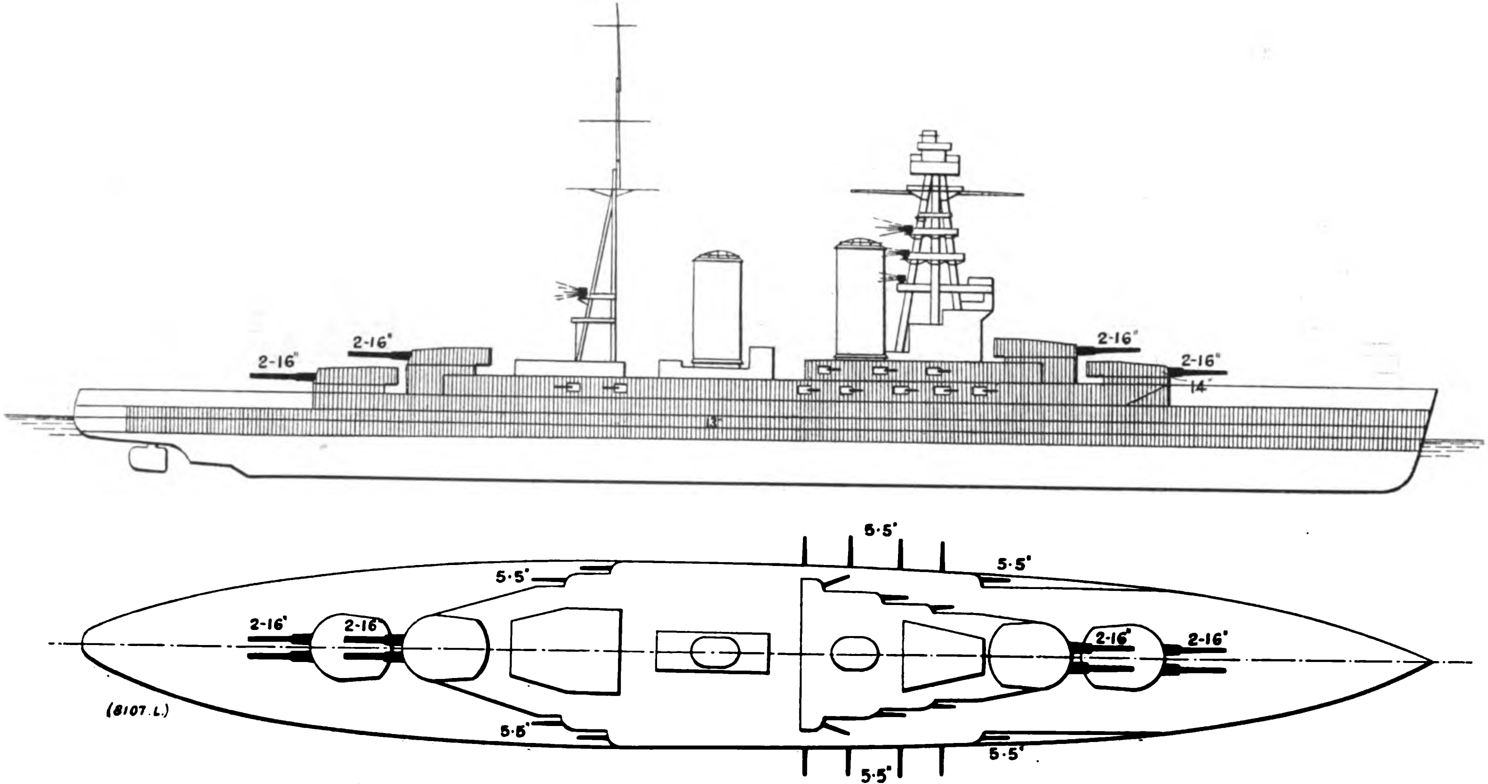


Length (water-line), 446 ft. 3 ins. ; 4,480 tons ; Speed, 28·28 knots ; Completed, 1912.
Armament, 7—5·9-in. ; 2—3·4-in. A.A. ; 2 torpedo tubes submerged (19·7-in. torpedoes). Can carry 120 mines.

# JAPAN.

## BATTLESHIPS.

**Nagato.** **Mutsu.**

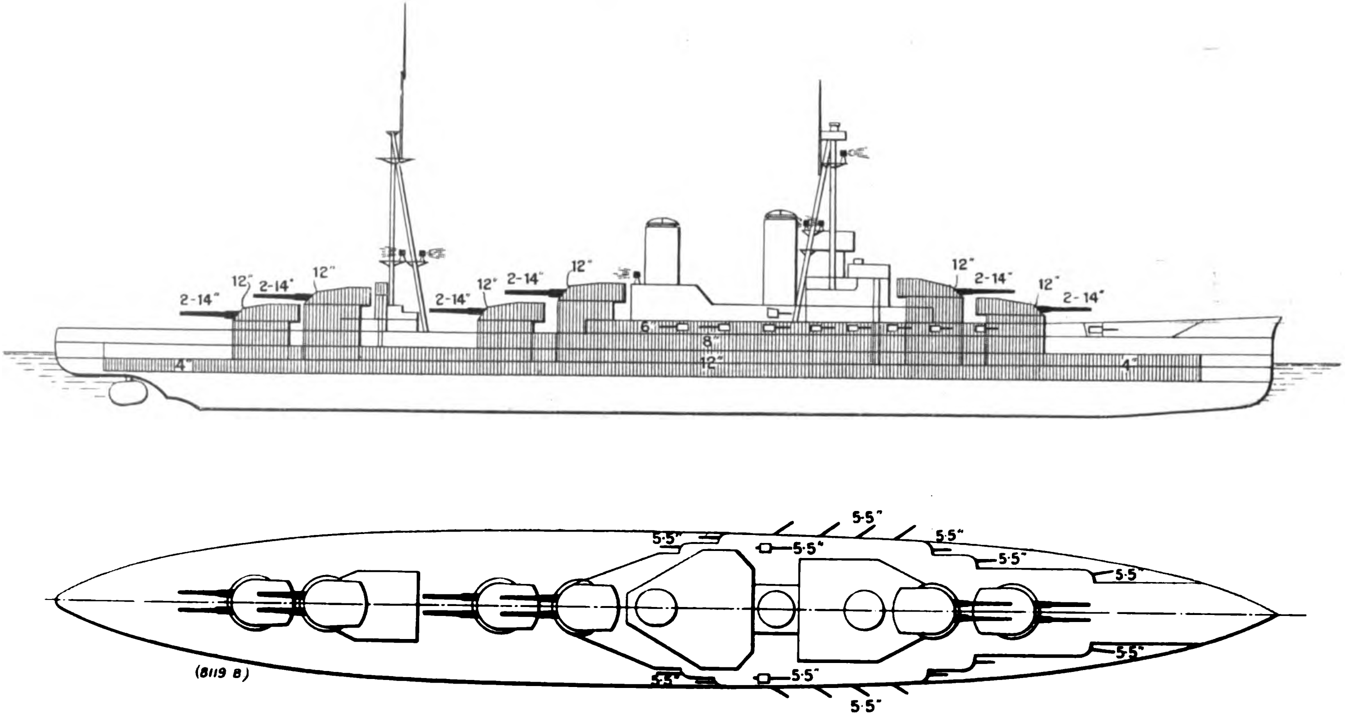


Length (extreme), 700 ft.; Length B.P., 660 ft. 7 ins.; Speed, 23 knots; 33,800 tons; Completed, 1920-1921. Armament, 8—16-in.; 20—5·5-in.; 4—12-pr. H.A.; 4 above-water and 4 submerged 21-in. torpedo tubes.

## JAPAN.

### BATTLESHIPS.

**Ise.** **Hyuga.**

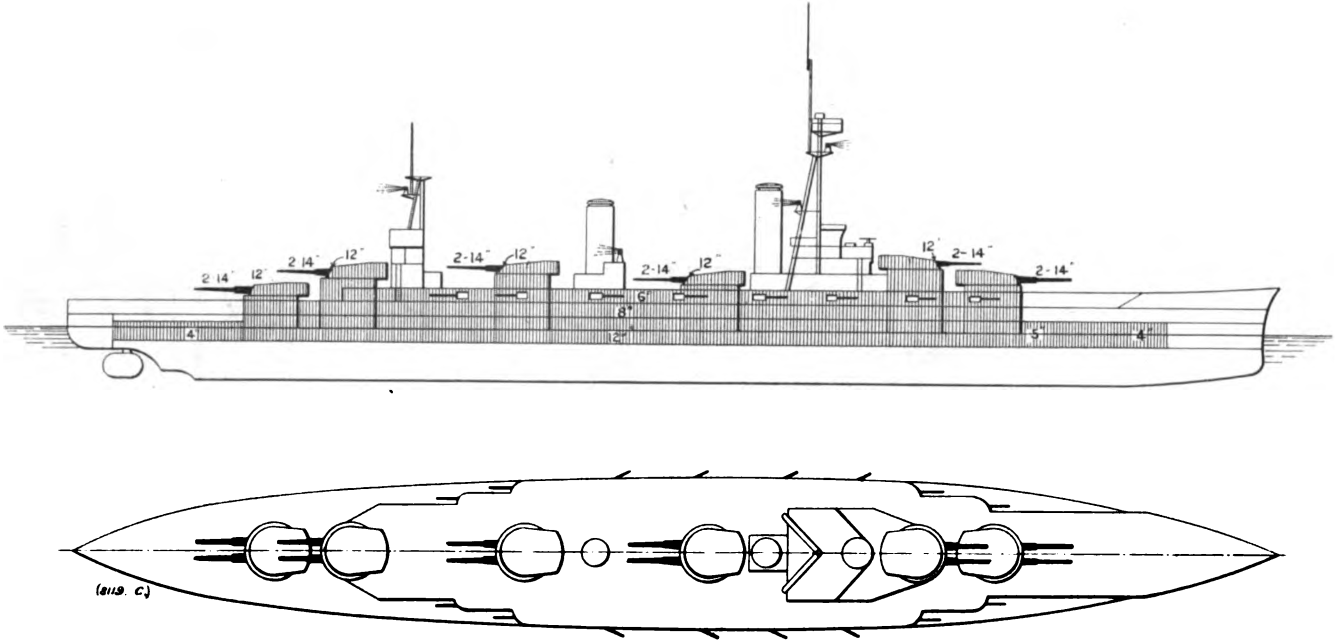


Length (extreme), 683 ft.; Length B.P., 640 ft.; Speed, 23 knots; 31,260 tons; Completed, 1917-18.
Armament, 12—14-in; 20—5·5-in.; 4—12-pr. H.A.; 6 submerged 21-in. torpedo tubes.

# JAPAN.

## BATTLESHIPS.

**Fuso.** **Yamashiro.**

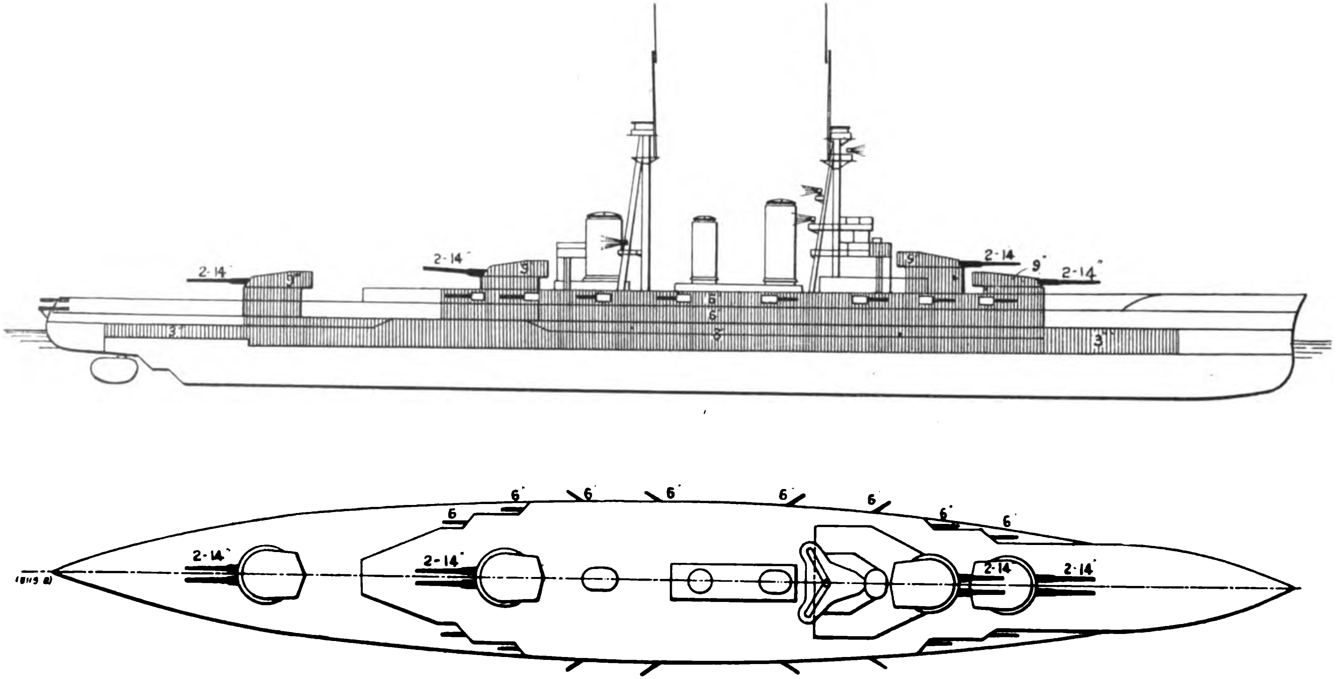


Length (extreme), 673 ft.; Length B.P., 630 ft.; Speed, 22·5 knots; 30,600 tons; Completed, 1915–17.
Armament, 12—14-in.; 16—6-in.; 4—12-pr. H.A.; 6 submerged 21-in. torpedo tubes.

## JAPAN.

### BATTLE-CRUISERS.

**Kongo.** **Hiyei.** **Haruna.** **Kirishima.**



Length (extreme), 704 ft. ; Length B.P., 653 ft. 6 ins. ; Speed, 27·5 knots ; 27,500 tons ; Completed, 1913–15.
Armament, 8—14-in. ; 16—6-in. ; 4—12-pr. H.A. ; 8 submerged, 21-in. torpedo tubes.

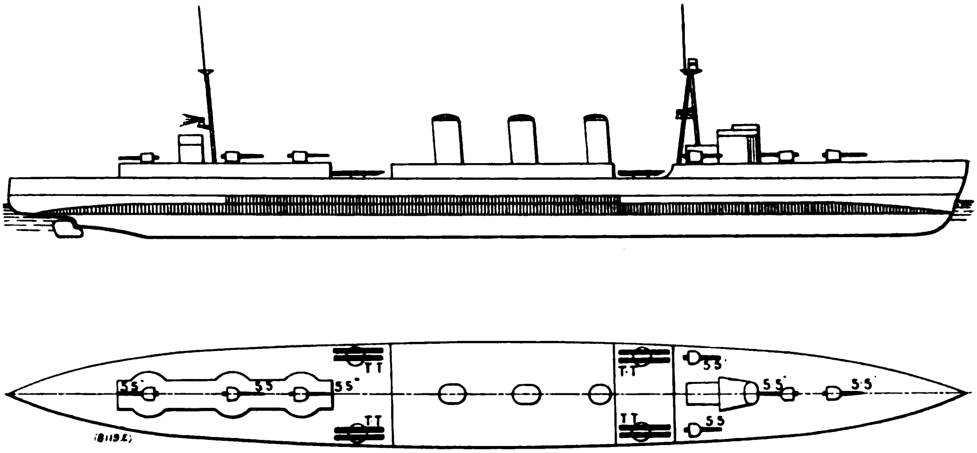
NOTE.—Funnels as shown for Kongo ; in the other three ships the forward funnel is slightly farther aft

## JAPAN

### LIGHT CRUISERS.

| | | | |
|---|---|---|---|
| * **Isudzu.**<br>**Nagara.** | **Natori.**<br>**Yura.** | **Abukama.**<br>**Kinu.** | **Jintsu.**<br>**Sendai.** |

**Oh-I.** **Kiso.** **Kitakami.** **Tama.** **Kuma.**

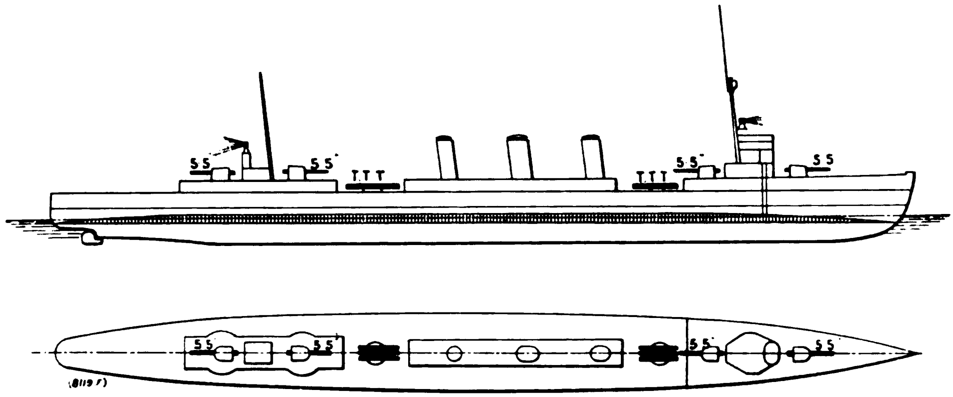


Length (extreme), 535 ft ; Length B.P., 500 ft. ; Speed, 33 knots ; 5,500 tons ; Completed, 1920-21.
Armament, 7—5·5-in. ; 2—12-pr. H.A. ; 4 twin above-water 21-in torpedo tubes.

* Plans apply generally to these vessels except that aircraft hangar is arranged in bridge structure. The displacement is about 70 tons higher than Oh-I, etc. Six of these vessels were completed, 1921-24.

### LIGHT CRUISERS.

**Tatsuta.** **Tenryu.**

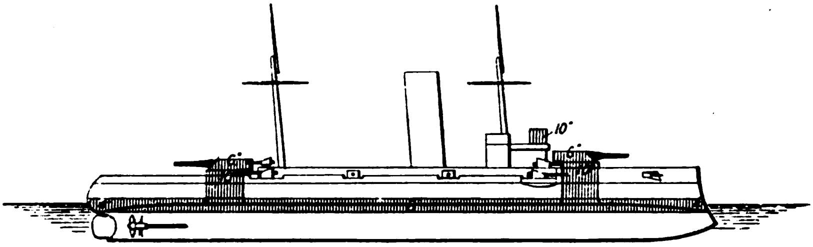


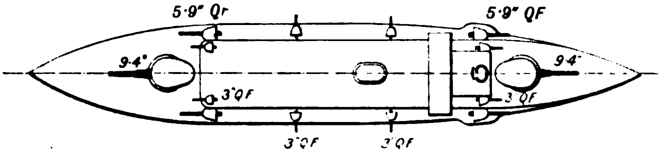
Length (extreme), 450 ft. ; Speed, 33 knots ; 3,500 tons ; Completed, 1919.
Armament, 4—5·5-in. ; 1—12-pr. H.A. ; 2 triple above-water torpedo tubes.

## NETHERLANDS.

### COAST DEFENCE SHIPS.

**De Ruyter.** **Hertog Hendrik.** **Marten Tromp.**



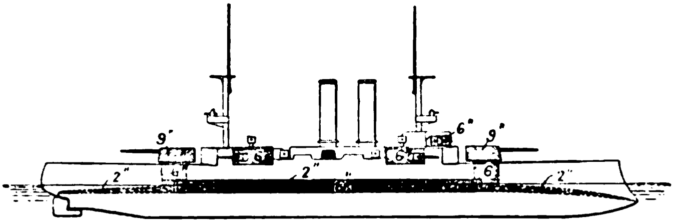


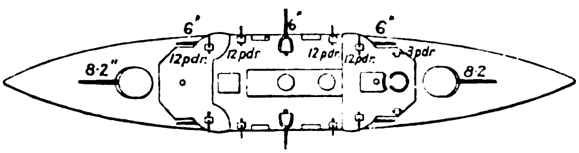
Length, 316½-330 ft. ; 5000—5216 tons ; Speed, 14·5 knots : Completed, 1903—1906.
Armament, De Ruyter and Hertog Hendrik : 2—9·4-in. ; 6—5·9-in. ; 4—2·9-in. ; 4 or 6 small.
Marten Tromp : 2—9·4-in. ; 4—5·9-in. ; 8—2·9-in. ; 6 small.

## NORWAY.

### COAST DEFENCE SHIPS.

**Norge.** **Eidsvold.**



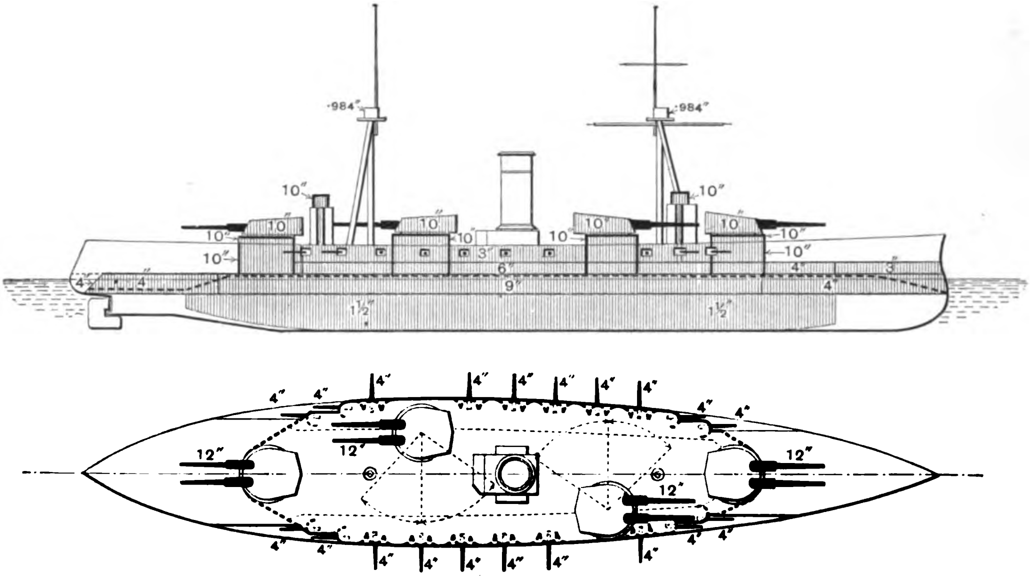


Length, 290 ft. ; 4,233 tons ; Speed, 16·9 knots ; Completed, 1901.
Armament, 2—8·2-in. ; 6—6-in. ; 8—12-pr. ; 6 small.

# SPAIN.

## BATTLESHIPS.

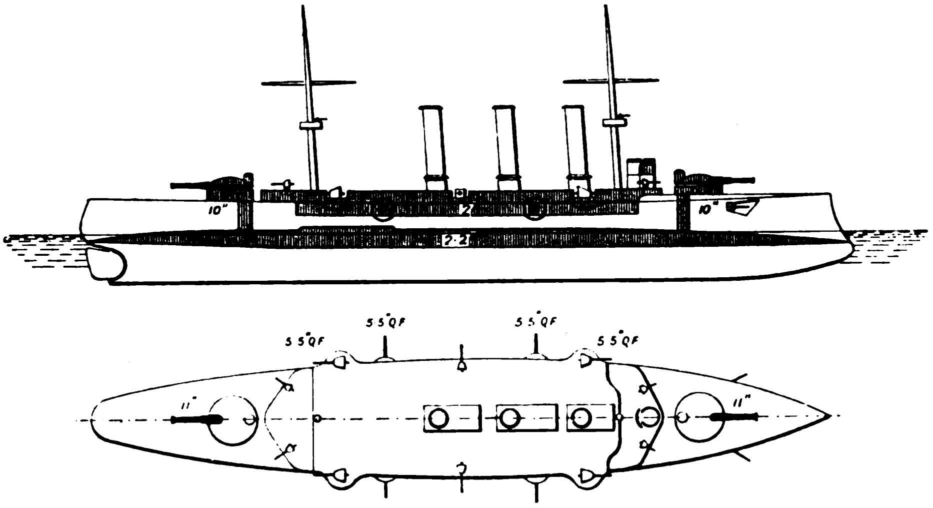
**Alphonso XIII.** **España.*** **Jaime I.**



Length (extreme), 459 ft. ; Length W.L., 435 ft. ; 15,460–15,700 tons ; Speed, 19·5 knots to 20·2 knots ; Completed, 1913–1916
Armament, 8—12-in. ; 20—4-in. ; 6 small.
* España wrecked in August, 1923.

## ARMOURED CRUISER.

**Emperador Carlos V.**

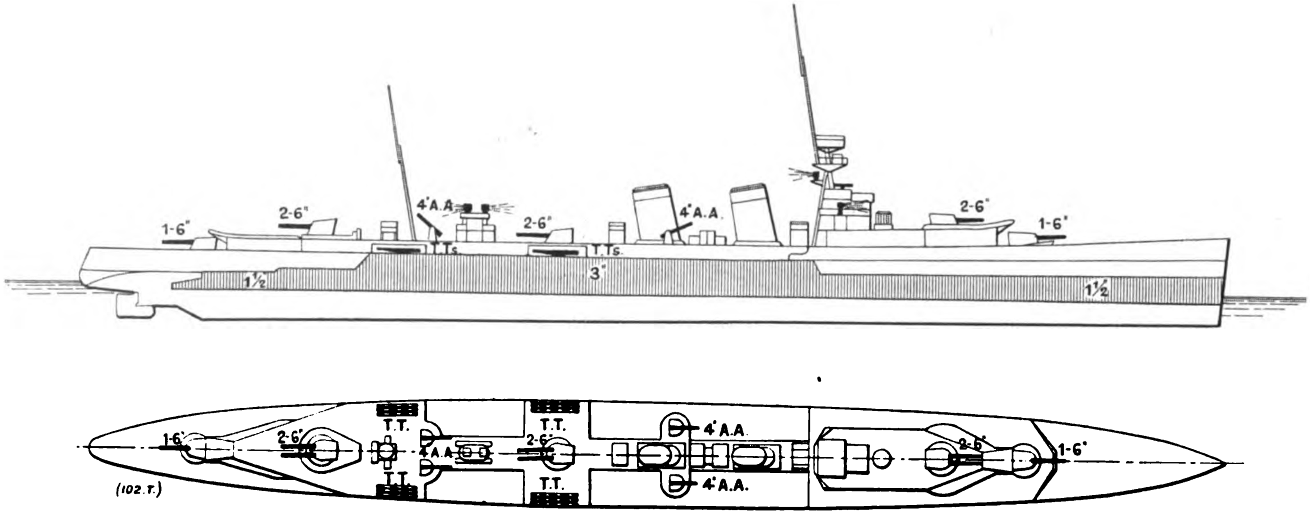


Length, 404 ft. ; 9,900 tons ; Speed, 19 knots ; Completed, 1898.
Armament, 2—11-in. ; 8—5·5-in. ; 4—4·1-in. ; 22 small.

# SPAIN.

## LIGHT CRUISERS.

**Principe Alfonso.** **Almirante Cervera.**

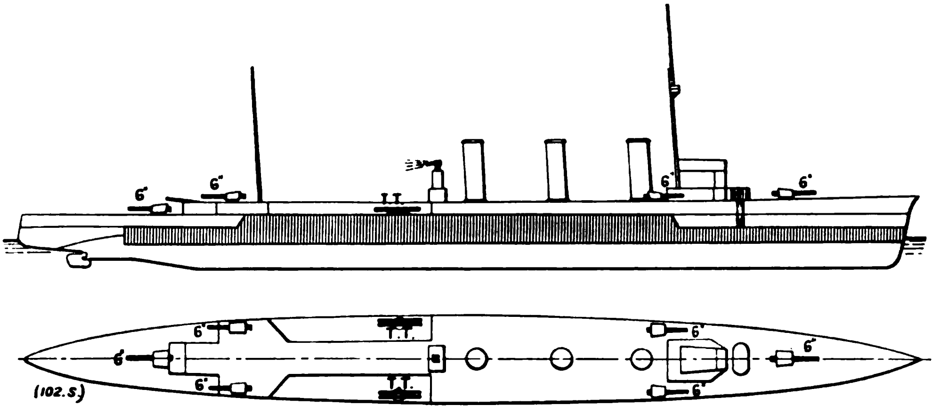


Length (extreme), 579 ft. 6 in. ; Length, B.P., 545 ft. ; 7,850 tons ; Speed, 33 knots. (Building).
Armament, 8—6-in. ; 4—4-in. A.A., 2—3 pr., 4 triple above-water torpedo tubes (21-in. torpedoes).

# SPAIN.

## LIGHT CRUISERS.

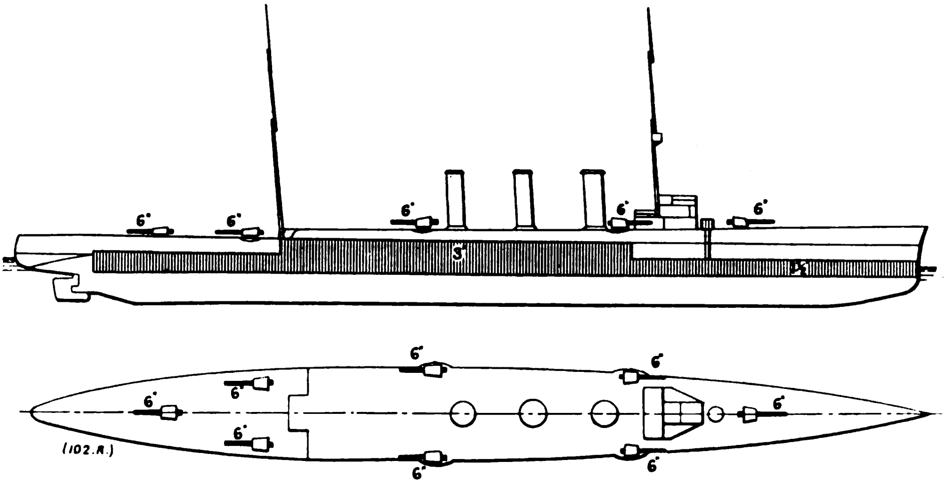
**Don Blas Lezo.** **Mendez Nuñez.**



Length (extreme), 462 ft. ; Length B.P., 439 ft. ; 4,700 tons ; Speed, 29 knots. (Building.)
Armament, 6—6-in. ; 4—3-pr. A.A. ; 4 M. ; 4 above-water torpedo tubes (21-in. torpedoes).

## LIGHT CRUISER.

**Reina Victoria Eugenia.**



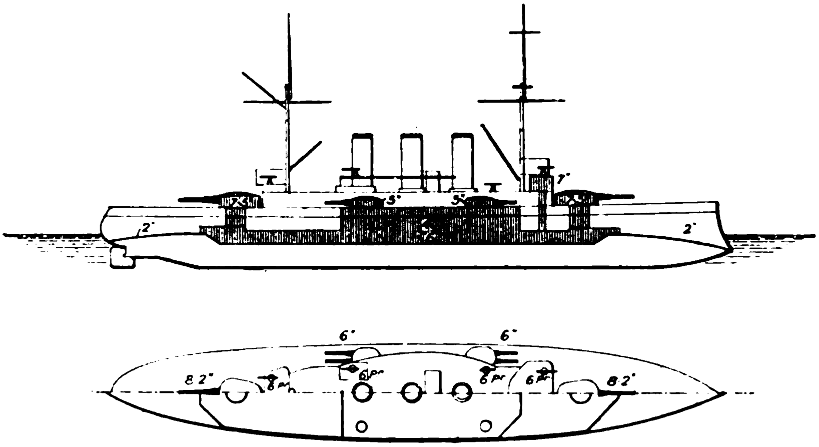
Length (extreme), 462 ft. ; 5,700 tons ; Speed, 25½ knots ; Completed, 1922.
Armament, 9 *—6-in. ; 1—12-pr. ; 4—3-pr. A.A. ; 4 M. ; 1 L. ; 4 torpedo tubes.

* NOTE.—There should be two 6-in. guns abreast forward instead of one on the centre line as shown.

# SWEDEN.

## BATTLESHIP.

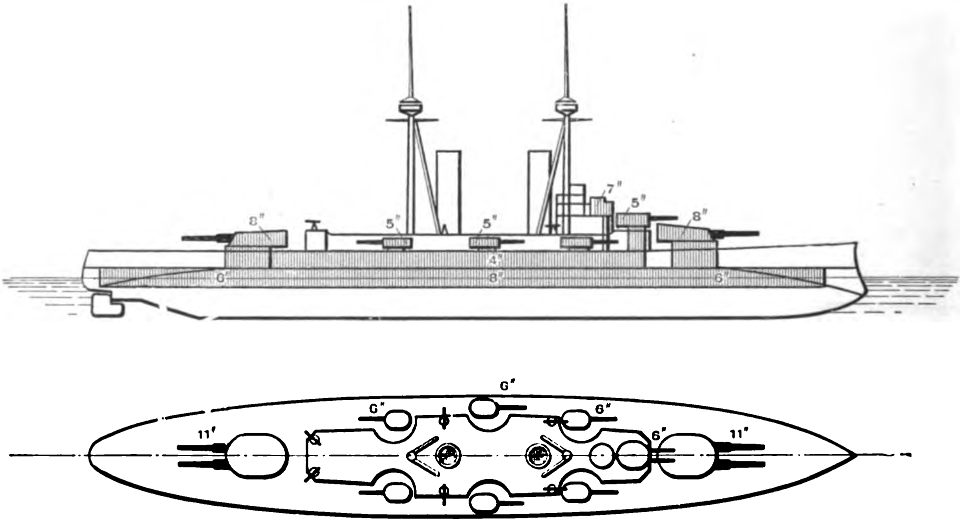
### Oscar II.



**Length, 313·6 ft. ; 4,658 tons ; Speed, 18 knots ; Completed, 1907.
Armament, 2—8·2-in. ; 8—6-in. ; 14 small.**

## ARMOURED CRUISERS.

**Drottning Victoria.** **Gustav V.** **Sverige.**

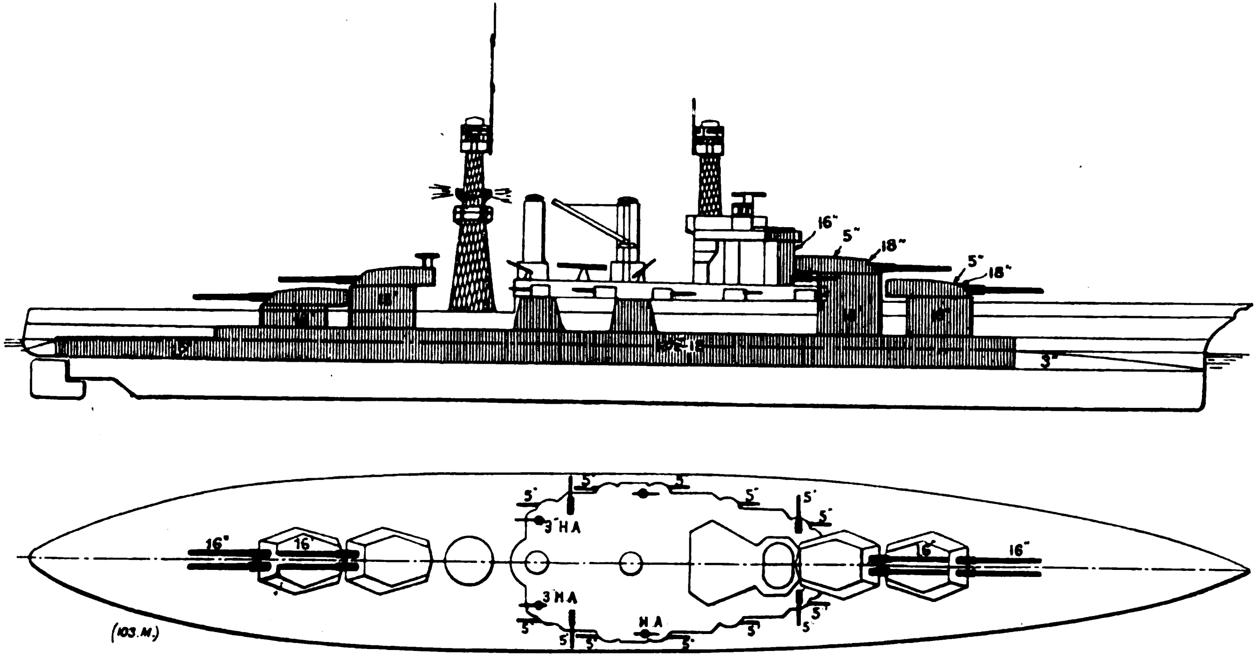


**Length, 396·7 ft. ; 7,605 tons ; Speed, 22 knots ; Completed, 1917–1922.
Armament, 4—11-in. ; 8—6-in. ; 6—12-pr. ; 4 small.**

# UNITED STATES.

## BATTLESHIPS.

**Colorado.** **Maryland.** **West Virginia.**



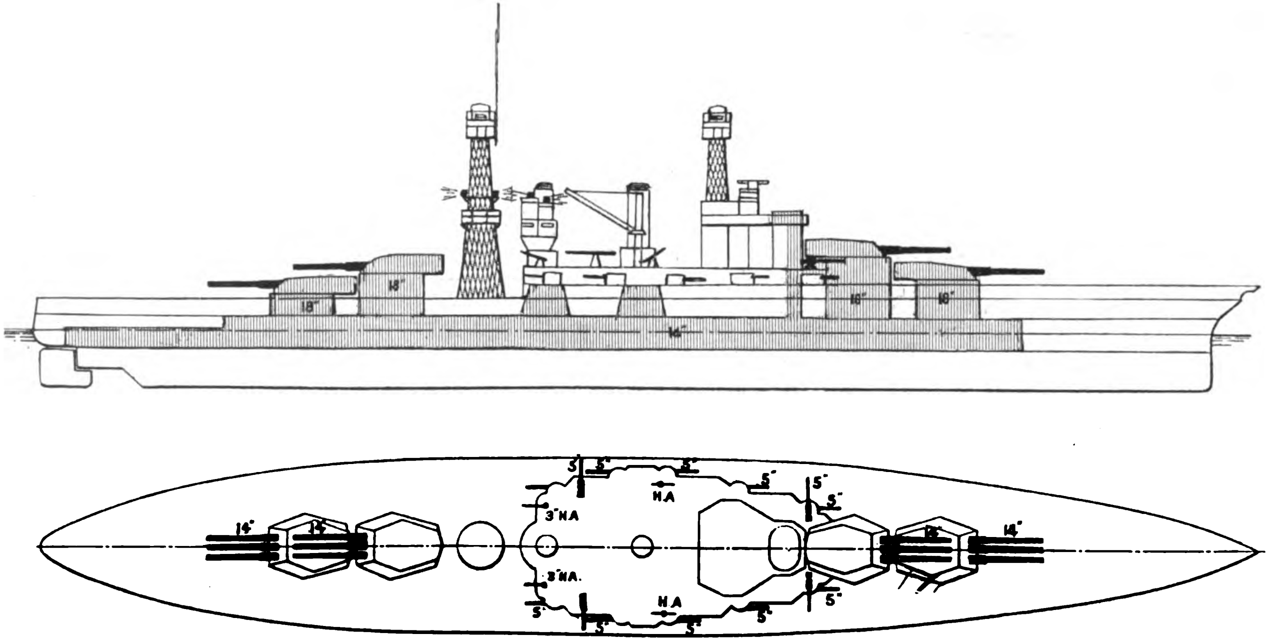
Length (extreme), 624 ft. ; Length W.L., 600 ft. ; Speed, 21 knots ; 32,600 tons ; Maryland, completed, 1921 ; Colorado and West Virginia, completed, 1923.

Armament, 8—16-in. ; 12—5-in. ; 8—3-in. H.A. ; 4—6-pr. ; 2 submerged 21-in. torpedo tubes.

# UNITED STATES.

## BATTLESHIPS.

**California.** **Tennessee.**

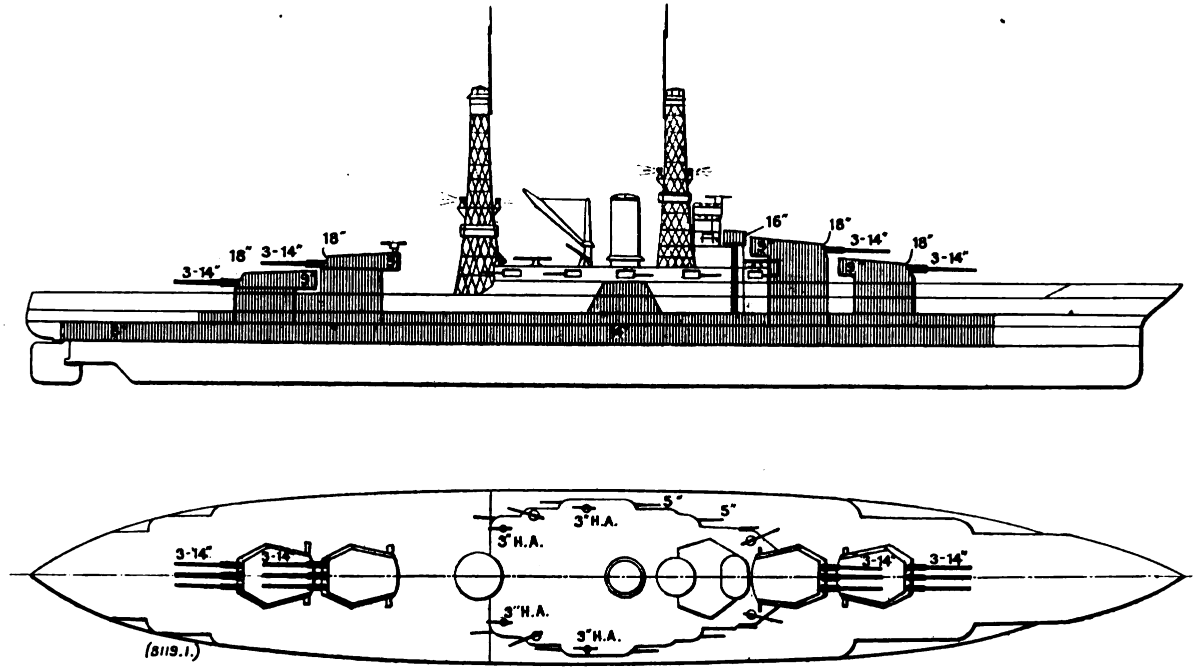


Length (extreme), 624 ft. ; Length W.L., 600 ft. ; Speed, 21 knots ; 32,300 tons ; Completed, 1920–21.
Armament, 12—14-in. ; 12—5-in. ; 8—14-pr. H.A. ; 4—6-pr. : 2 submerged 21-in. torpedo tubes.

## UNITED STATES.

### BATTLESHIPS.

**Idaho.** **New Mexico.** **Mississippi.**



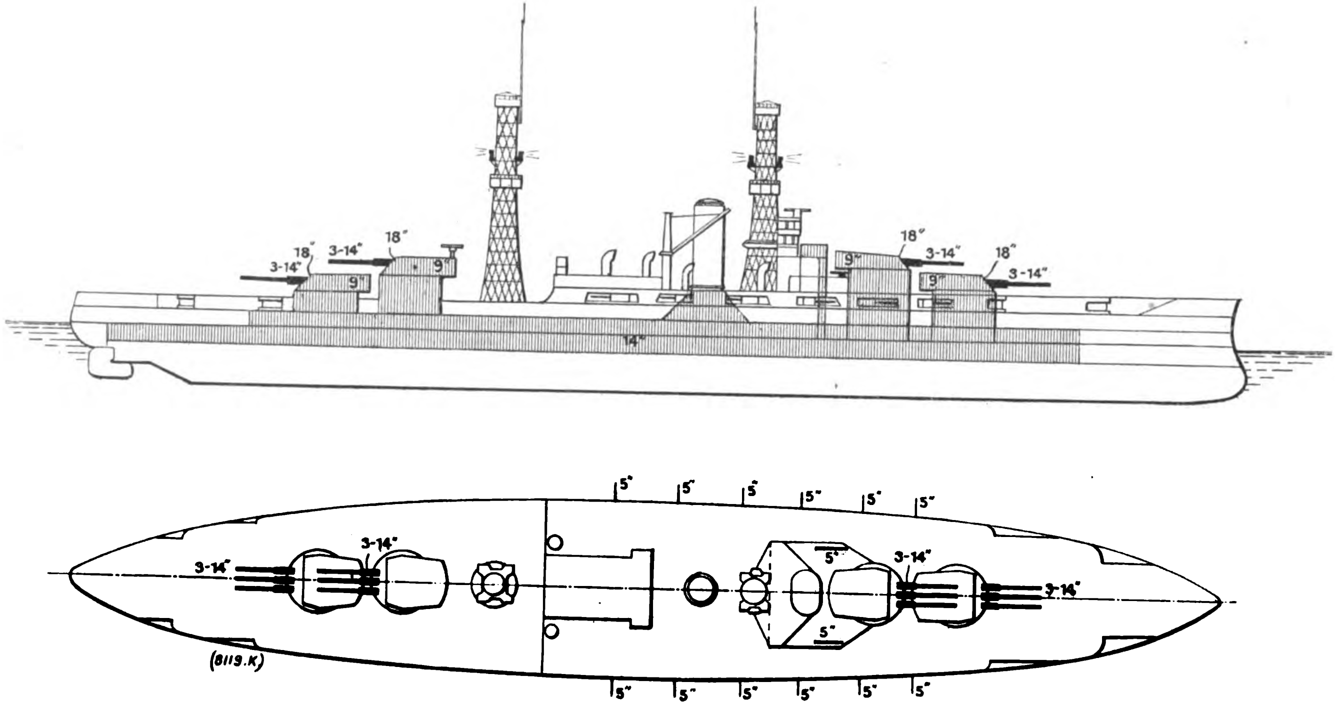
Length (extreme), 624 ft.; Length W.L., 600 ft.; Speed, 21 knots; 32,000 tons; Completed, 1917-19. Armament, 12—14-in.; 12—5-in.; 8—14-pr. H.A.; *4—6-pr.; 2 submerged 21-in. torpedo tubes.

* Idaho, 4—3-pr.

## UNITED STATES.

### BATTLESHIPS.

**Arizona.** **Pennsylvania.**

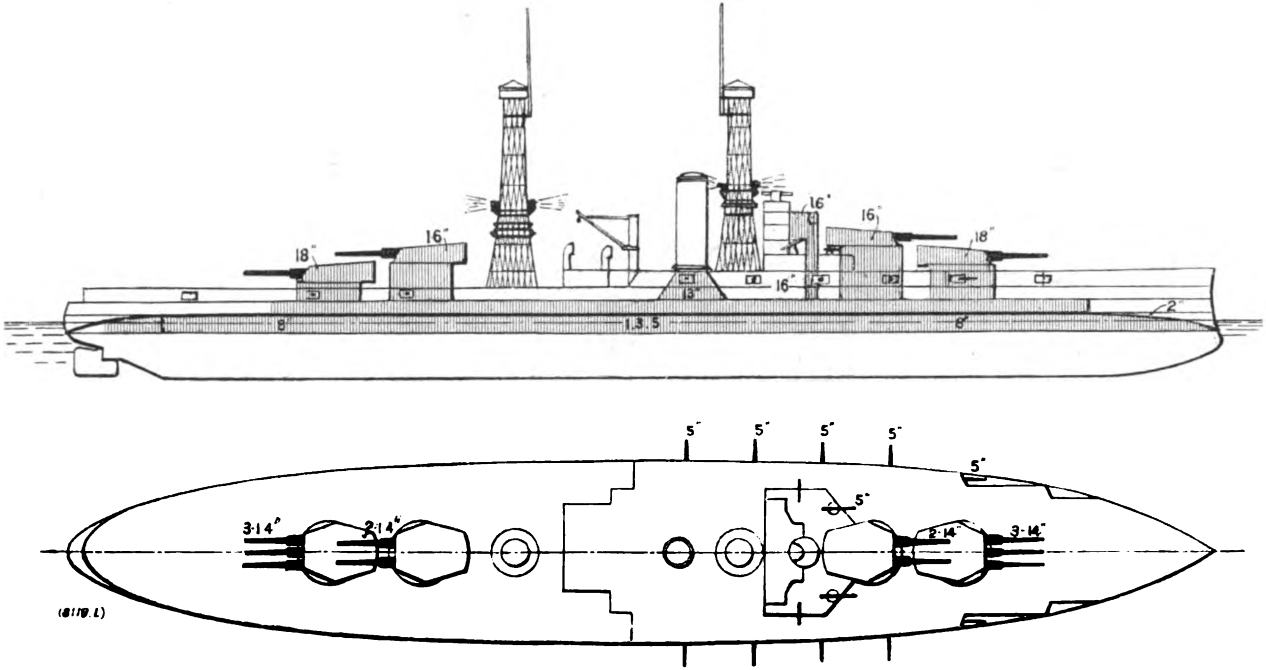


Length (extreme), 608 ft.; Length B.P., 596 ft.; Speed, 21 knots; 31,400 tons; Completed, 1916.
Armament, 12—14-in.; 14—5-in.; 8—3-in. H.A.; 4—3-pr.; 2 submerged 21-in. torpedo tubes.

## UNITED STATES.

### BATTLESHIPS.

**Nevada.** **Oklahoma.**

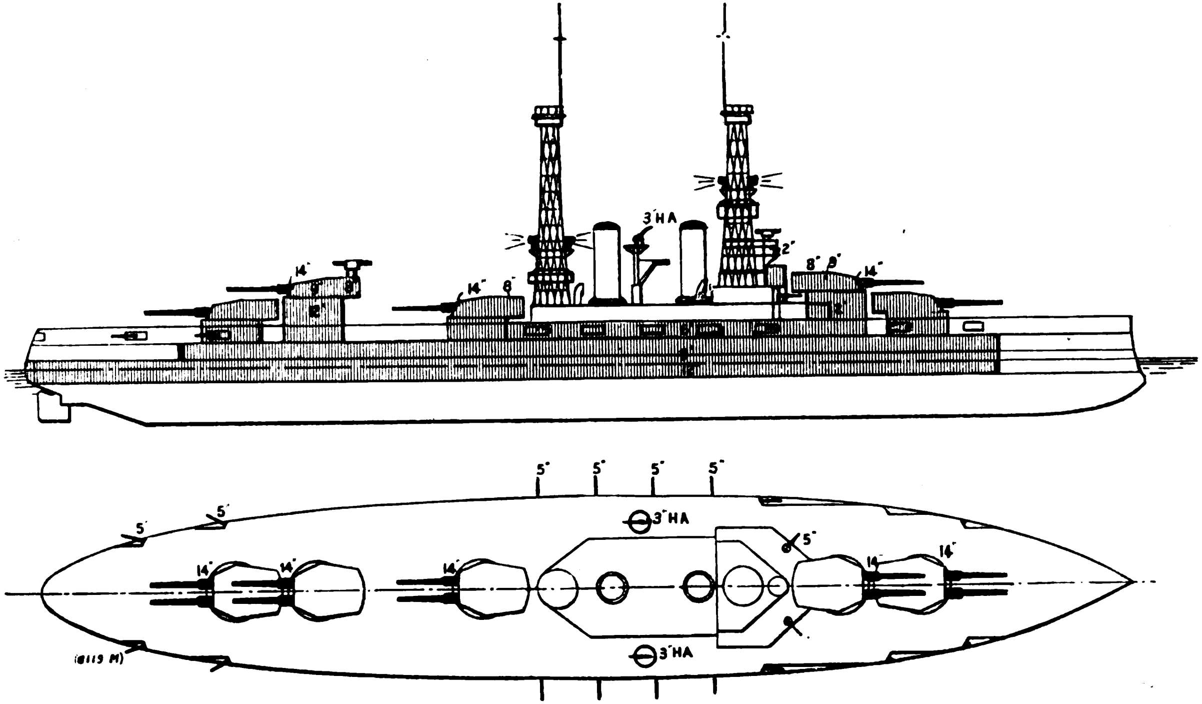


Length (extreme), 583 ft. ; Length W.L., 575 ft.; Speed, 20·5 knots ; 27,500 tons ; Completed, 1916.
Armament, 10—14-in. ; 12—5-in. ; 8—3-in. H.A. ; 4—3-pr. ; 2 submerged 21-in. torpedo tubes.

# UNITED STATES.

## BATTLESHIPS.

**New York.** **Texas.**

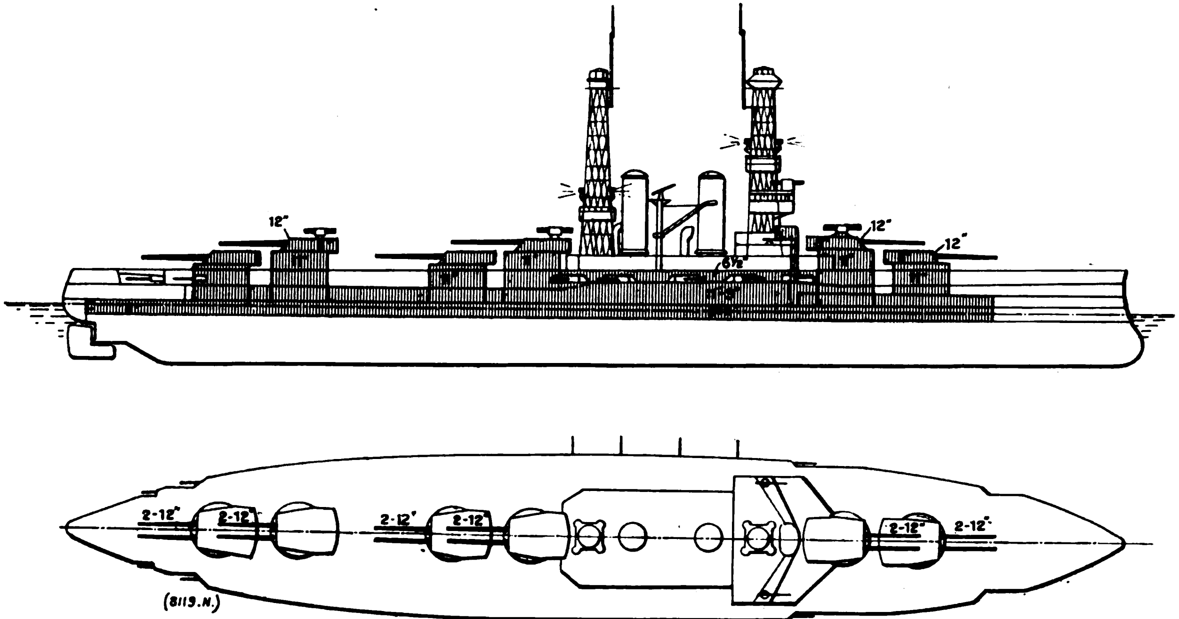


Length (extreme), 573 ft. ; Length W.L., 565 ft. ; Speed, 21 knots ; 27,000 tons ; Completed, 1914.
Armament, 10—14-in. ; 16—5 in. ; 8—3-in. H.A. ; 4—3-pr. ; 4 submerged 21-in. torpedo tubes.

## UNITED STATES.

### BATTLESHIPS.

**Arkansas.** **Wyoming.**



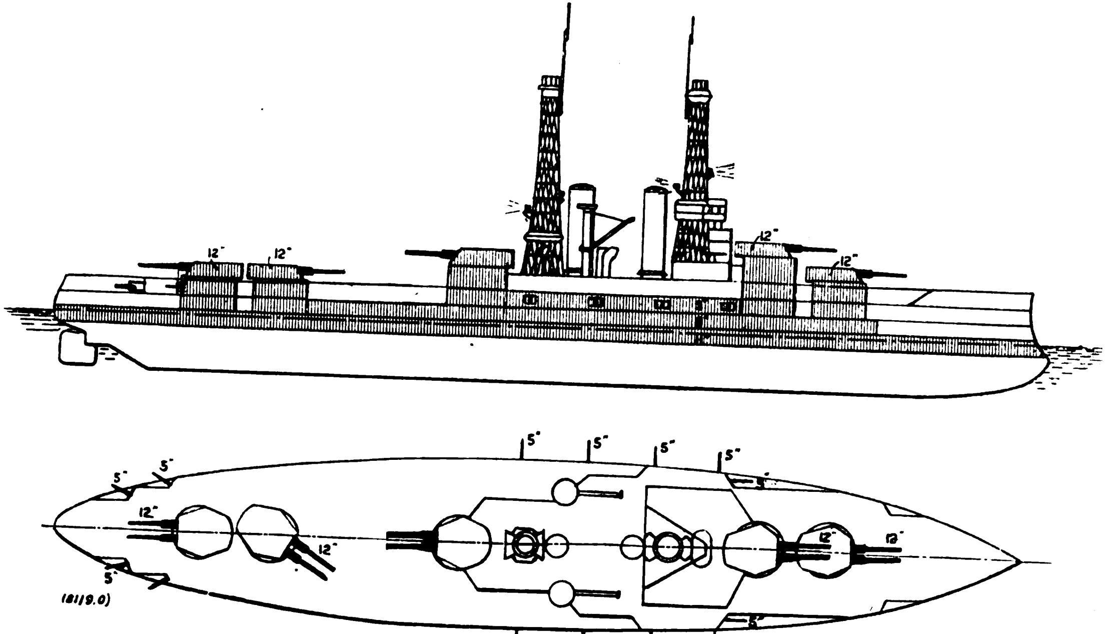
Length (extreme), 562 ft. ; Length W.L., 554 ft. ; Speed, 20·5 knots ; 26,000 tons ; Completed, 1912.
Armament, 12—12 in. ; 16—5 in. ; 8—3 in. H.A. ; 4 or 6*—3-pr. ; 2 submerged 21-in. torpedo tubes.

* Wyoming.

# UNITED STATES.

## BATTLESHIPS.

**Utah.** **Florida.**



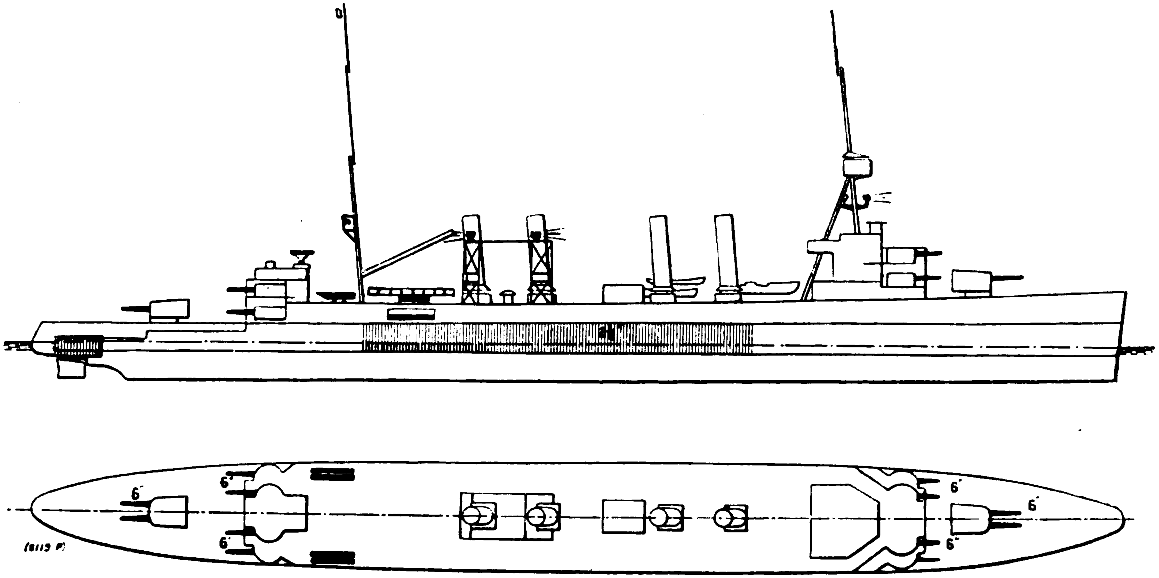
Length (extreme), 521 ft. 6 ins. ; Length W.L., 510 ft. ; Speed, 20·75 knots ; 21,825 tons ; Completed, 1911.
Armament, 10—12-in. ; 16—5-in. ; 8—3-in. H.A. ; 4 or *6—3-pr. ; 2 submerged 21-in. torpedo tubes.

* Florida.

## UNITED STATES.

### SCOUT CRUISERS.

Cincinnati. Concord. Detroit. Raleigh. Marblehead. Richmond. Memphis. Trenton. Milwaukee. Omaha.



Length (extreme), 555 ft. 6 ins.; Length W.L., 550 ft.; Speed, 33·7 knots; 7,500 tons; 8 completed in 1923-24; Marblehead and Memphis probably complete end of 1924. Armament, 12—6-in.; 4—3-pr. H.A.; 2—3-pr.; 2 twin and 2 triple above-water 21-in. torpedo tubes.

# BRITISH AND FOREIGN ORDNANCE TABLES.

# ELSWICK B.L. AND Q.F. GUNS.

This Table is supplied by the Manufacturers.

| | Automatic for Aircraft. | | | | Semi-Automatic. | | | Semi-Automatic. | Non-recoil. | | Naval Landing. | Anti-Air-craft. | Anti-Air-craft. | Semi-Automatic. | Jointed Gun. | | Semi-Automatic. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter of Bore .........ins. | 1·457 | 1·457 | 0·9 | 1·85 | 1·85 | 1·85 | 2·24 | 2·24 | 2·24 | 2·953 | 3 | 3* | 3 | 3 | 3 | 4 | 4 | 4·7 | 4·7 |
| do. do. .........mm. | 37 | 37 | 22·86 | 47 | 47 | 47 | 57 | 57 | 57 | 75 | 76 | 76 | 76 | 76 | 76 | 102 | 102 | 120 | 120 |
| Length of Bore .........cals. | 45 | 40 | 66 | 40 | 46 | 50 | 40 | 50 | 27 | 14·13 | 18·8 | 28 | 50 | 50 | 19·2 | 50 | 40 | 45 | 50 |
| | lb. | lb. | lb. | cwts. | cwts. | cwts. | cwts. | cwts. | lb. | cwts. | cwts. | cwts. | cwts. | cwts. | cwts. | cwts. | cwts. | cwts. | cwts. |
| Weight of Gun .................. | 340 | 230 | 230 | 4·51 | 5·0 | 7·5 | 7·5 | 10·5 | 329 | 1·875 | 4 | 8 | 19 | 23 | 4·5 | 42 | 27 | 53 | 66 |
| do. do. .........kilos. | 154 | 104 | 104 | 230 | 254 | 381 | 381 | 533 | 149 | 95 | 203 | 406 | 978 | 1168 | 229 | 2134 | 1360 | 2692 | 3353 |
| do. Projectile .........lbs. | 1·5 | 1·5 | 6 oz. | 3·3 | 3·3 | 3·3 | 6 | 6 | 6 | 11·75 | 12·5 | 12·5 | 12·5 | 14·33 | 14·33 | 31 | 31 | 45 | 45 |
| do. do. ......kilos. | 0·681 | 0·681 | 0·17 | 1·5 | 1·5 | 1·5 | 2·722 | 2·722 | 2·72 | 5·33 | 5·67 | 5·67 | 5·67 | 6·5 | 6·5 | 14·06 | 14·06 | 20·41 | 20·41 |
| | oz. | oz. | oz. | oz. | oz. | lb. oz. | oz. | lb. oz. | oz. | oz. | oz. | lb. | lb. oz. | lb. | ozs. | lb. | lb. | lb. oz. | lb. |
| do. Charge, M.D. Cordite | 2¼ | 2¼ | 1¼ | 8·25 | 10·0 | 1 0 | 10 | 1 2·5 | 7¾ | 7·75 | 15 | 1·1 | 3 2¼ | 5·75 | 15 | 10·5 | 5·0 | 9 11 | 14 |
| do. do. do. kilos. | 0·071 | 0·071 | 0·042 | 0·234 | 0·283 | 0·453 | 0·283 | 0·525 | 0·22 | 0·22 | 0·369 | 0·5 | 1·43 | 2·608 | 0·425 | 4·76 | 2·27 | 4·395 | 6·35 |
| Muzzle Velocity .........f.s. | 2035 | 2000 | 2800 | 2132 | 2300 | 2680 | 1968 | 2400 | 1000 | 1100 | 1585 | 1640 | 2700 | 3050 | 1485 | 3000 | 2300 | 2600 | 3000 |
| do. do. ......m.s. | 620 | 609 | 853 | 650 | 701 | 817 | 600 | 731 | 305 | 335 | 483 | 500 | 823 | 930 | 452 | 914 | 701 | 792 | 914 |
| Muzzle Energy .........f.t. | 43 | 41·6 | 20·4 | 104 | 121 | 164 | 161 | 240 | 41·6 | 98 | 213 | 233 | 632 | 922 | 218 | 1934 | 1137 | 2109 | 2808 |
| do. do. .........m.t. | 13·3 | 12·8 | 6·3 | 32·2 | 37·5 | 50·8 | 49·8 | 74·3 | 12·8 | 30·3 | 66 | 72 | 196 | 285·5 | 67·5 | 599 | 352 | 653 | 869·6 |
| Penetration at Muzzle ...ins. | 3·5 | 3·4 | 3·6 | 5·15 | 5·8 | 7·3 | 5·4 | 7·3 | 1·95 | .. | .. | 5·1 | 10·8 | 13·7 | .. | 17·4 | 11·6 | 15·6 | 19·3 |
| (Tressider Wrought Iron Pl.) | | | | | | | | | | | | | | | | | | | |
| do. do. ...mm. | 88·9 | 86·3 | 91·4 | 130·8 | 147·3 | 185·4 | 137·2 | 185·4 | 49·5 | .. | .. | 129·5 | 274 | 348·0 | .. | 442·0 | 294·6 | 396·2 | 490·2 |
| Rounds per Minute ............ | 70 | 70 | 80 | 25 | 30 | 30 | 25 | 30 | .. | 20 | 20 | 20 | 20 | 25 | 15 | 12 | 20 | 12 | 12 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diameter of Bore .........ins. | 5 | 5·5 | 6 | 6 | 7·5 | 7·5 | 8 | 8 | 9·2 | 9·2 | 10 | 10 | 12† | 12† | 13·5 | 14† | 15 | 15 | 16 | 18 |
| do. do. .........mm. | 127·2 | 139·7 | 152 | 152 | 190 | 190 | 203 | 203 | 234 | 234 | 254 | 254 | 305 | 305 | 343 | 355·6 | 381 | 381 | 406 | 457 |
| Length of Bore .........cals. | 45 | 50 | 45 | 50 | 45 | 50 | 45 | 50 | 45 | 50 | 45 | 50 | 45 | 50 | 45 | 45 | 40 | 45 | 45 | 40 |
| | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons |
| Weight of Gun .................. | 4·05 | 5·65 | 8·4 | 8·75 | 13·8 | 15·75 | 18·0 | 20·4 | 26·75 | 28·82 | 36·25 | 38·25 | 59·3 | 66·7 | 76 | 85 | 85 | 98·6 | 108 | 152 |
| do. do. .........kilos. | 4114 | 5740 | 8535 | 8890 | 14021 | 16003 | 18289 | 20727 | 27179 | 29289 | 36832 | 38864 | 60252 | 67770 | 77216 | 86364 | 86364 | 96118 | 109728 | 154440 |
| do. Projectile .........lbs. | 60 | 83 | 100 | 100 | 200 | 200 | 250 | 250 | 380 | 380 | 500 | 500 | 850 | 850 | 1250 | 1400 | 1920 | 1925 | 2130 | 3320 |
| do. do. ......kilos. | 27·2 | 37·6 | 45·36 | 45·36 | 90·72 | 90·72 | 113·4 | 113·4 | 172·37 | 172·37 | 226·8 | 226·8 | 385·55 | 385·55 | 567 | 635 | 871 | 873·2 | 966 | 1506 |
| | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. | lb. |
| do. Charge, M.D. Cordite | 16 | 25·0 | 31 | 33·0 | 74 | 76 | 80 | 90 | 122 | 136 | 167 | 200 | 260 | 285 | 296 | 324 | 380 | 400 | 580 | 690 |
| do. do. do. kilos. | 7·25 | 11·34 | 14·061 | 15·0 | 33·566 | 34·473 | 36·29 | 40·82 | 55·34 | 61·7 | 75·75 | 90·72 | 117·93 | 129·3 | 134·26 | 147 | 172·3 | 181 | 263 | 313 |
| Muzzle Velocity ............f.s. | 2700 | 2900 | 2800 | 3000 | 2900 | 3000 | 2845 | 3000 | 2750 | 3000 | 2800 | 3000 | 2800 | 3000 | 2700 | 2700 | 2362 | 2500 | 2630 | 2400 |
| do. do. .........m.s. | 823 | 884 | 853 | 914 | 884 | 914 | 867 | 914 | 838 | 914 | 853 | 914 | 853 | 914 | 823 | 823 | 720 | 762 | 801·6 | 731 |
| Muzzle Energy ............f.t. | 3032 | 4840 | 5436 | 6240 | 11663 | 12481 | 14031 | 15000 | 19926 | 23714 | 27181 | 31203 | 46208 | 53046 | 63187 | 70770 | 74275 | 83425 | 102160 | 132600 |
| do. do. .........m.t. | 939 | 1499 | 1683·4 | 1932 | 3611·9 | 3865·2 | 4345·2 | 4831·2 | 6171 | 7340 | 8418 | 9663 | 14310 | 16428 | 19568 | 21916 | 23002 | 25835 | 31670 | 41065 |
| Penetration at Muzzle ...ins. | 18·4 | 25·8 | 22·9 | 25·5 | 30·6 | 32·3 | 32·2 | 34·9 | 35·2 | 40·1 | 39·7 | 44·1 | 47·3 | 52·5 | 51·3 | 53·2 | 49·1 | 53·7 | 58 | 60 |
| (Tressider Wrought Iron Pl.) | | | | | | | | | | | | | | | | | | | | |
| do. do. ...mm. | 724 | 701·0 | 581·6 | 647·7 | 777·2 | 820·4 | 817·9 | 886·4 | 894·1 | 1018·5 | 1008·4 | 1120·1 | 1201·4 | 1333·5 | 1362·0 | 1351·3 | 1247 | 1364 | 1473 | 1524 |
| Rounds per Minute ............ | 10 | 10 | 9 | 9 | 6 | 6 | 5 | 5 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

Corrected to September, 1924.

* This gun can be arranged for anti-torpedo boat attack also.

† These guns can be used on Railway Truck Mountings.

# ELSWICK LAND AND AIR SERVICE GUNS AND HOWITZERS.

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calibre ... ... ... ins. | 0·9 | 1·457 | 1·457 | 1·575 | 1·85 | 2·244 | 2·244 | 2·75 | 2·75 | 2·78 | 2·953 | 3 | 3 | 3 | 3 | 3 | 3 | 5·3 | 3·3 |
| do. ... ... ... mm. | 22·8 | 37 | 37 | 40 | 47 | 57 | 57 | 70 | 70 | 70·6 | 75 | 76·2 | 76·2 | 76·2 | 76·2 | 76·2 | 76·2 | 83·81 | 83·8 |
| Length of Bore... calibres | 56 | 45 | .. | 25 | .. | 23 | 20·4 | 26·5 | .. | .. | 15·2 | 30 | 31 | 28 | 23 | 45 | 23 | 36·37 | 28 |
| | lbs. | lbs. | lbs. | lbs. | lbs. | cwts. | lbs. | lbs. | lbs. | lbs. | lbs. | cwts. | cwts. | cwts. | cwts. | cwts. | cwts. | cwts. | cwts. |
| Weight of Gun ... ... ... | 222 | 412 | 33 | 102 | 83 | 5 | 350 | 400 | 92 | 280 | 260 | 9·5 | 9·25 | 7·25 | 6 | 15 | 5·25 | 9·5 | 9 |
| do. do. ... ... kilos | 101 | 187 | 15 | 46 | 37·65 | 254 | 159 | 182 | 41·7 | 127 | 118 | 482 | 469 | 368 | 305 | 762 | 266 | 482 | 456 |
| Type of Breech Mechanism | Auto Block | Auto Block | Block | Semi-Auto | Block | Semi-Auto | Revolver Type | Screw | Block | Screw | Screw | Block | Screw | Block | Block | Block | Screw | Screw | Screw |
| System of Obturation ... | C. Case | C. Case | C. Case | C. Case | C. Case | C. Case | Bare Charges | De Bange | C. Case | De Bange | C. Case | C. Case | C. Case | C. Case | C. Case | C. Case | C. Case | C. Case | C. Case |
| Muzzle Velocity ft.-secs. | 2800 | 2000 | 1400 | 1474 | 1200 | 1580 | 1000 | 1200 | 850 | 317 | 1310 | 1725 | 2000 | 1750 | 1700 | 2600 | 1640 | 1722 | 1636 |
| do. metre-secs. | 853 | 610 | 427 | 449 | 366 | 481 | 304 | 365 | 259 | 96·5 | 399 | 526 | 609 | 533 | 518 | 792 | 500 | 524 | 498 |
| Weight of Projectile ... lbs. | 6 ozs. | 1½ | 1·5 | 2 | 3·3 | 6 | 6 | 12·5 | 10 | 100 | 12·5 | 12·5 | 12·5 | 14·3 | 12·5 | 12·5 | 12·5 | 20·5 | 18·5 |
| do. do. ... kilos | 0·17 | 0·68 | 0·68 | 0·91 | 1·5 | 2·72 | 2·72 | 5·67 | 4·53 | 45·36 | 5·67 | 5·67 | 5·67 | 6·48 | 5·67 | 5·6 | 5·67 | 9·25 | 8·39 |
| Rounds per Minute ... ... | 90 | 80 | 20 | 30 | 20 | 25 | 25 | 25 | 15 | .. | 25 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Type of Mounting ... | Air Service or Tanks | Air Service Automatic | Infantry Gun | Tank | Infantry Gun | Tank | Two Barrelled Aeroplane Guns Non-recoil | Mountain Gun Jointed on Field Carriage | Infantry Gun Field & French Howitzer | Trench Stick Bomb Thrower | Mountain Gun Diff-recoil | Submarine | Anti-aircraft on Motor Lorry | Field | Horse and Field | Anti-aircraft | Naval Landing | Field | Field |
| | To Suit Aircraft | To Suit Aircraft | 6 loads<br>33 lbs. | cwt. | 10 | cwt. | lbs. | cwt. | 9 loads<br>max. | cwts. | cwt. | tons | tons | cwt. | cwts. | tons | cwt. | cwt. | cwt. |
| Weight of Carriage or | | | each | 3½ | loads | 7 | 24 | 8 | 100lbs. | 9·5 | 7 | 1·22 | 1·2 | 15 | 13¼ | 1·85 | 9·75 | 19·25 | 17 |
| Mounting ... ... kilos | | | 15 | 178 | | 355 | 11 | 406 | 45 | 843 | 358 | 1232 | 1220 | 765 | 673 | 1867 | 500 | 977 | 864 |
| Maximum Elevation ... ... | | | 15° | 20° | 75° | 20° | 40° | 15° | 65° | 45°–70° | 40° | 75° | 80° | 16° | 16° | 90° | 15° | 40° | 16° |
| ,, Depression ... | | | 0 | 15° | 0 | 15° | 40° | 15° | 0 | 0 | 10° | 5° | 0 | 5° | 5° | 10° | 15° | 5° | 5° |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calibre ... ... ... ins. | 4 | 4·5 | 4·7 | 5 | 6 | 6 | 6 | 8 | 9·2 | 9·2 | 9·45 | 11 | 12 | 12 | 14 | 18 |
| do. ... ... ... mm. | 101·6 | 114·3 | 120 | 127 | 152 | 152 | 152 | 203 | 234 | 234 | 240 | 279·4 | 305 | 305 | 355·6 | 457·2 |
| Length of Bore... calibres | 45 | 20 | 12·0 | 8·4 | 45 | 12·2 | 50 | 15 | 13·2 | 35 | .. | 5·3 | 17 | 17·3 | 45 | 34·7 |
| | tons | cwts. | cwts. | tons | tons | ton | tons | tons | tons | tons | cwts. | cwts. | tons | tons | tons | tons |
| Weight of Gun... ... ... | 2·25 | 14·75 | 8 | 2 | 7·45 | 1 | 8·7 | 2·9 | 3·4 | 24·2 | 11·25 | 13·2 | 12·55 | 11·25 | 83·25 | 85·7 |
| do. do. ... ... kilos | 2300 | 748 | 397 | 2032 | 7525 | 1016 | 8840 | 2946 | 3454 | 22774 | 553 | 670 | 12751 | 11430 | 84585 | 87075 |
| Type of Breech Mechanism | Screw | Screw | Block | Screw | Screw | Block | Screw | Screw | Screw | Screw | Screw | Screw | Screw | Screw | Screw | Screw |
| System of Obturation ... | C. Case | De Bange | C. Case | De Bange | De Bange | C. Case | De Bange | De Bange | De Bange | De Bange | C. Case | De Bange | De Bange | De Bange | De Bange | De Bange |
| Muzzle Velocity ft.-secs. | 2600 | 1450 | 1156 | 2150 | 2800 | 1000 | 3000 | 1200 | 1190 | 2300 | 444 | 400 | 1350 | 1450 | 2500 | 1900 |
| do. metre-secs. | 792 | 442 | 350 | 655 | 854 | 305 | 914 | 396 | 362 | 701 | 135 | 122 | 4115 | 442 | 762 | 579 |
| Weight of Projectile ... lbs. | 31 | 35 | 35 | 60 | 100 | 100 | 100 | 200 | 290 | 380 | 170 | 200 | 981 | 750 | 1586 | 2500 |
| do. do. ... kilos | 14·06 | 15·87 | 15·87 | 27·21 | 45·4 | 45·36 | 45·36 | 90·72 | 131·54 | 172·36 | 77·11 | 96·72 | 445 | 340·2 | 719·4 | 1134 |
| Rounds per Minute ... ... | 15 | 12 | 15 | 10 | 8 | 9 | 7 | 6 | 4 | 4 | .. | 3 | 2 | 2 | 2 | 2 |
| Type of Mounting ... | Anti-Aircraft | Field Howitzer | Field Howitzer | Position Gun Field Carriage | Field Carriage | Howitzer | Railway Truck | Howitzer Railway Truck | Howitzer Field Carriage | Railway Truck | Trench Bomb Thrower | Trench Mortar | Howitzer Land Service | Howitzer Railway Truck | Railway Truck | Howitzer Railway Truck |
| | tons | cwts. | cwts. | tons | tons | .. | tons | tons | tons | tons | tons | tons | tons | tons | tons | tons |
| Weight of Carriage or | 4·55 | 19·2 | 17·3 | 3·25 | 5·5 | .. | 10 | 24·6 | 5·35 | 65·5 | 3·9 | 2·8 | 39·75 | 49·5 | 163·75 | 163·75 |
| Mounting ... ... kilos | 4648 | 984 | 882 | 3300 | 5605 | .. | 10160 | 25000 | 5435 | 66550 | 3960 | 2845 | 40100 | 50300 | 166380 | 166380 |
| Maximum Elevation... ... | 90° | 50° | 50° | 20° | 20° | .. | 40° | 45° | 45° | 40° | 20°-45° | 45°-80° | 65° | 65° | 40° | .. |
| ,, Depression ... | 10° | 5° | 5° | 5° | 5° | .. | 0 | 0° | 0° | 0° | 0° | 0 | 8° | 2° | 0° | .. |

Corrected to September, 1924.

# ELSWICK "ALL STEEL" GUNS.

## This Table is supplied by the Manufacturers.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calibre ... ... ... ... ins. | 1·457 | 1·85 | 2·75 | 3 | 3·3 | 4·5 | 5·87 | 6 | 6 | 8 | 8 | 14 | 16 | 16 |
| do. ... .. ... ... m.m. | 37 | 47 | 69·85 | 76·2 | 83·8 | 114·3 | 149·1 | 152·4 | 152·4 | 203·2 | 203·2 | 355·59 | 406·4 | 406·4 |
| Length of Bore ... calibres | 25 | 20 | 12 | 45 | 33 | 20 | 8·47 | 45 | 50 | 50 | 50 | 45 | 45 | 50 |
| | lbs. | lbs. | lbs. | cwts. | cwts. | cwts. | cwts. | tons | tons | tons | tons | tons | tons | tons |
| Weight of Gun ... ... ... | 41 | 83 | 112 | 13¼ | 8¼ | 10 | 7 | 5 | 5·47 | 13·15 | 15·3 | 62 | 83 | 103¼ |
| do. ... ... ... kilos | 18·6 | 37·65 | 50·8 | 673 | 432 | 508 | 356 | 5080 | 5563 | 13,360 | 15,543 | 62,995 | 84,332 | 105,161 |
| Type of Breech Mechanism ... | Block | Block | Block | Block | Screw | Screw | Block | Screw | Screw | Block | Screw | Screw | Screw | Screw |
| System of Obturation ... ... | C. Case | C Case | C. Case | C. Case | C. Case | De Bange or C. Case | C. Case | De Bange | De Bange | C. Case | De Bange | De Bange | De Bange | De Bange |
| Muzzle Velocity ... feet-secs. | 1400 | 1200 | 850 | 2600 | 1750 | 1400 | 750 | 2800 | 3000 | 2900 | 2940 | 2500 | 2700 | 2953 |
| do. ... metre-secs. | 427 | 366 | 259 | 792·5 | 533 | 427 | 228 | 853 | 914 | 884 | 896 | 762 | 823 | 900 |
| Weight of Projectile ... ... lbs. | 1·5 | 3·3 | 10 | 12·5 | 20·5 | 35 | 70 | 100 | 100 | 253·5 | 256 | 1586 | 2130 | 2130 |
| do. ... ... kilos | 0·68 | 1·5 | 4·54 | 5·67 | 9·3 | 15·87 | 31·75 | 45·36 | 45·36 | 115 | 116 | 719·4 | 966·1 | 966·1 |
| Rounds per Minute ... ... ... | 25 | 25 | 20 | 20 | 20 | 12 | 10 | 9 | 9 | 5 | 4 | 2 | 2 | 2 |
| Type of Mounting ... ... | Infantry Field Carriage | Infantry Field Carriage, and Trench Howitzer | Infantry Field Carriage, and Trench Howitzer | Anti-Air-craft | Field Carriage | Field Carriage | Trench Mortar | Upper Deck with Shield Open at Rear | | Upper Deck with Totally Enclosed Gun House | | Railway Truck Mounting | | |
| Weight of Carriage or Mounting ... ... ... ... kilos | 155 lbs.<br>70·3 | lbs.<br>500<br>kilos<br>226·8 | lbs.<br>584<br>kilos.<br>248·6 | cwts.<br>29·75<br>1511 | cwts.<br>20<br>1016 | cwts.<br>20<br>1016 | With base for<br>Concrete 2 ton 2032<br>Earth 2·8 ton 2845 | tons<br>15·6<br>15,850 | tons<br>15·6<br>15,850 | tons<br>67<br>68,076 | tons<br>67<br>69,076 | tons<br>163·75<br>166,380 | | |
| Maximum Elevation... ... ... | 15° | As Field Gun 75°<br>As Trench How. 35° min. 56° max. | As Field How. 10° min. 65° max.<br>As Trench How. 25° Min. 55° Max | 85° | 40° | 70° | 60° | 35° | 35° | 60° | 60° | 40° | | |
| „ Depression ... ... | 5° | 5°<br>0° | 0°<br>0° | 5° | 5° | 10° | 0° | 10° | 10° | 5° | 5° | 0° | | |

Corrected to September, 1924.

# BEARDMORE GUNS AND HOWITZERS.

**This Table is supplied by the Manufacturers.**

(September, 1924.)

| Calibre. | | Length of Bore. | Weight. | | Projectile. | | $\frac{W}{d^3}$. | Muzzle Velocity. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|
| ins. | mm. | Calibres. | Tons. | Cwts. | Lbs. | Kilos. | | ft.-secs. | m.-secs. | |
| 16 | 406 | 45 | 107 | 0 | 2100 | 952·5 | 0·51 | 2675 | 815·3 | |
| 15 | 381 | 45 | 96 | 0 | 1850 | 839·2 | 0·548 | 2620 | 798·6 | |
| 13·5 | 343 | 46 | 77 | 0 | 1350 | 612·4 | 0·548 | 2650 | 807·7 | |
| 12 | 304 | 50 | 66 | 0 | 950 | 430·9 | 0·548 | 2825 | 861·0 | |
| 9·2 | 234 | 50 | 29 | 0 | 425 | 192·8 | 0·548 | 2825 | 861·0 | |
| 9·2 | 234 | 17 | 4 | 5 | 290 | 131·5 | 0·377 | 1500 | 457·2 | Howitzer. |
| 8 | 203 | 55 | 18 | 5 | 252 | 114·3 | 0·49 | 3000 | 914·4 | |
| 8 | 203 | 50 | 17 | 10 | 252 | 114·3 | 0·49 | 2900 | 883·9 | |
| 8 | 203 | 17 | 3 | 0 | 200 | 90·72 | 0·39 | 1500 | 457·2 | Howitzer (a). |
| 7·5 | 190 | 45 | 13 | 18 | 200 | 90·72 | 0·474 | 2750 | 838·2 | |
| 6 | 152 | 55 | 8 | 7 | 100 | 45·36 | 0·463 | 3025 | 922·0 | |
| 6 | 152 | 50 | 7 | 18 | 100 | 45·36 | 0·463 | 2950 | 899·1 | |
| 6 | 152 | 35 | 3 | 14 | 100 | 45·36 | 0·463 | 2375 | 723·9 | Field Gun (a). |
| 6 | 152 | 13 | 1 | 6 | 100 | 45·36 | 0·463 | 1250 | 381·0 | Howitzer. |
| 5·5 | 140 | 55 | 5 | 18 | 82 | 37·2 | 0·49 | 3000 | 914·4 | |
| 5·5 | 140 | 50 | 5 | 10 | 82 | 37·2 | 0·49 | 2900 | 883·9 | |
| 4·7 | 120 | 45 | 3 | 4 | 45 | 20·4 | 0·434 | 2750 | 838·2 | |
| 4·724 | 120 | 27 | 0 | 8·6 | 36 | 16·33 | 0·341 | 1050 | 320·0 | Howitzer (b). |
| 4 | 102 | 55 | 2 | 9 | 31 | 14·06 | 0·484 | 3000 | 914·4 | |
| 4 | 102 | 55 | 2 | 9 | 25 | 11·34 | 0·4 | 3200 | 975·3 | Anti-Aircraft. |
| 4 | 102 | 50 | 2 | 3 | 31 | 14·06 | 0·484 | 2920 | 890·0 | |
| | | | Cwts. | Kilos. | | | | | | |
| 3·3 | 84 | 31 | 8·6 | 437·0 | 18·5 | 8·39 | 0·566 | 1750 | 533·4 | Field Gun (b). |
| 3·0 | 76 | 55 | 21·0 | 1067·0 | 12·5 | 5·67 | 0·463 | 3000 | 914·4 | Anti-Aircraft. |
| 2·24 | 57 | 23 | 5·6 | 284·0 | 6 | 2·72 | 0·534 | 1525 | 464·8 | Tank Gun. |
| 1·85 | 47 | 30 | 1·8 | 90·7 | 3·3 | 1·49 | 0·526 | 1750 | 533·4 | Tank Gun. |
| 1·57 | 40 | 37 | 0·92 | 46·3 | 2·0 | 0·91 | 0·517 | 1900 | 579·0 | Light Field Gun (c). |
| 2·24 | 57 | 24 | 0·88 | 44·7 | 4·4<br>bomb. | 2·0 | 0·39 | 950 | 289·0 | Light Howitzer (c). |

(a) (a), (b) (b), (c) (c) } Alternatives to suit the same Field Carriage.

## SIZE AND FIGHTING QUALITIES OF BRITISH BATTLESHIPS OF DIFFERENT PERIODS.

| Name. | Date of Completion. | Displacement. | Side Armour. | Speed. | Total Weight of Shot in One Round. | Collective Energy at Muzzle of One Round. |
|---|---|---|---|---|---|---|
| | | tons. | in. | knots. | lb. | foot-tons. |
| Warrior . . . . . . . . . . . . . | 1861 | 9,210 | 4½-in. wrought-iron | 14½ | 3,800 | 61,476 |
| Hercules. . . . . . . . . . . . . | 1868 | 8,680 | 9-in. to 6-in. wrought-iron | 14 | 5,400 | 70,200 |
| Alexandra . . . . . . . . . . . . | 1877 | 9,490 | 12-in. to 6-in. wrought-iron | 15 | 5,426 | 71,400 |
| Inflexible . . . . . . . . . . . . | 1881 | 11,880 | 24-in. to 16-in. wrought-iron | 13 | 6,936 | 123,120 |
| Benbow . . . . . . . . . . . . . | 1888 | 10,600 | 18-in. compound | 16·75 | 4,600 | 135,560 |
| Royal Sovereign . . . . . . . . . | 1892 | 14,150 | 18-in. and 5-in. compound | 17·5 | 5,800 | 159,610 |
| Barfleur . . . . . . . . . . . . . | 1894 | 10,500 | 12-in. compound | 18·5 | 2,450 | 67,670 |
| Canopus . . . . . . . . . . . . . | 1900 | 12,950 | 6-in. hardened steel | 18·25 | 4,600 | 178,720 |
| Prince of Wales . . . . . . . . . | 1902 | 15,000 | 9-in. super-hardened steel | 18·25 | 4,600 | 194,400 |
| King Edward VII. . . . . . . . . . | 1905 | 16,350 | 9-in. hardened steel | 19 | 6,100 | 271,800 |
| Dreadnought . . . . . . . . . . | 1906 | 17,900 | 11-in. hardened steel | 21 | 8,800 | 487,100 |
| Neptune . . . . . . . . . . . . . | 1911 | 20,600 | 12-in. hardened steel | 21·5 | 8,900 | 545,000 |
| Ajax . . . . . . . . . . . . . . | 1913 | 25,000 | 12-in. hardened steel | 21·5 | 14,500 | 625,000 |
| Queen Elizabeth . . . . . . . . . | 1914 | 27,500 | 13-in. hardened steel | 25 | { about 16,400 } | 710,000 |

## PARTICULARS OF SUCCESSIVE LARGE BRITISH NAVAL GUNS, 1800 TO 1921.

| Year. | Type | Weight. | | Length. | Calibre. | Weight of Projectile. | Weight of Charge. | Muzzle Energy. | Penetration of Wrought-iron at 1000 yards range. |
|---|---|---|---|---|---|---|---|---|---|
| | | tons. | cwt. | in. | in. | lb. | lb. | ft.-tons. | in. |
| 1800 | Cast-iron smooth-bore . . | 2 | 12 | 114 | 6·4 | 32 | 10 | 400 | — |
| 1842 | Ditto . . . . . . . | 4 | 15 | — | 8·12 | 68 | 16 | 700 | — |
| 1865 | Woolwich wrought-iron . | 4 | 10 | — | 7 | 115 | 22 | 1,400 | 7 |
| 1870 | Built-up muzzle-loader . . | 38 | 0 | 200 | 12·50 | 810 | 200 | 13,900 | 17 |
| 1880 | Ditto . . . . . . . | 80 | 0 | 321 | 16 | 1700 | 450 | 27,960 | 22½ |
| 1887 | Built-up breech-loader . . | 110 | 10 | 524 | 16·25 | 1800 | 960 | 54,390 | 32 |
| 1895 | Wire-wound breech-loader . | 46 | 0 | 445·5 | 12 | 850 | — | 33,940 | 34·6 |
| 1900 | Ditto . . . . . . . | 51 | 0 | 496·5 | 12 | 850 | 210 | 36,290 | 35·4 |
| 1905 | Ditto . . . . . . . | 58 | 0 | 558 | 12 | 850 | — | 47,700 | 46·2 |
| 1912 | Ditto . . . . . . . | 76 | 0 | 626 | 13·5 | 1400 | — | 60,600 | *50 |
| 1914 to 1920 | Ditto . . . . . . . | 97 | 0 | 675 | 15 | 1900 | — | 82.300 | *56 |
| 1921 | Ditto . . . . . . . | 117 | 0 | 720 | 16 | 2240 | — | 93,230 | *57 |

* At muzzle. Guns of 18-in. calibre were fitted to one cruiser during the War, but were subsequently removed and used in monitors.

# NAVAL REFERENCE SECTION.

# THE FIRST LORD'S STATEMENT EXPLANATORY OF THE NAVY ESTIMATES, 1924–25.

Inclusive of the provision of rather less than £1,800,000 for the commencement of five cruisers and two destroyers, as already announced to Parliament, the net total of Navy Estimates for 1924–25 is £55,800,000.

There is, therefore, a reduction of £2,200,000 as compared with the Estimates for the present year.

In regard to this reduction, it must be remembered that in any given year the great bulk of Naval Estimates consists of expenditure to which we are already committed by contractual or quasi-contractual obligations, *e.g.* contracts for shipbuilding or engineering works; forward contracts for the supply or manufacture of guns, stores, fuel, etc.; contracts of service with naval officers and men, reservists, and civilian employees of various kinds; obligations to pay retired pay and pensions, and so on. It is calculated that the amount of expenditure that does not come under these and similar headings, and on which definite reductions are possible that will take immediate effect, does not amount to more than about 10 per cent. of the whole.

Translated into pre-war figures by making allowance for differences in prices and wages, the total of £55,800,000 would represent approximately £34,500,000, of which £29,848,200 would be the provision made for effective services. Hence it will be seen that the scale of expenditure on the Navy has been brought much below the 1914–15 standard—in fact, to what it was about the year 1903–4, prior to the concentration of the fleet in home waters and its expansion to meet the growing German menace.

Estimates, in their main features, are dependent upon policy, and the Estimates now presented have in view simply the maintenance, with the strictest regard to economy, of the Navy at the accepted standard of strength and in a state of efficiency. They do not provide for any increase of that standard, nor for any new developments that could lead to the impression in any quarter that an increase of naval strength is our ultimate objective.

Apart from the completion or the progressing of vessels actually in hand, the only new construction provided for is the commencement of the five cruisers and the two destroyers already referred to. The cruisers are part replacement of the County Class cruisers which have already been scrapped and, but for reasons of economy, the Admiralty would have asked Parliamentary sanction to commence construction as scrapping occurred.

The time, however, has now arrived when this replacement construction can no longer be delayed, in view of the large numbers of light cruisers that will during the next few years reach an age at which they can no longer be relied upon as efficient units, and it is therefore strictly consistent with the policy above described.

In preparing the Estimates, special regard has been had to the fact that in three successive years, a substantial surplus has been realized on the provision made for naval requirements. These underspendings have been due chiefly to the progress on contract work of various descriptions proving slower than was anticipated in the original Estimates. A number of different reasons may be given to account for this, the principal (in order of importance) being labour disputes affecting the progress of work; delays in completing difficult and novel designs before contractors can proceed with supply; delays in getting possession of sites for works. For this coming year, His Majesty's Government have decided to discount these various causes of possible delay in advance, and the provision under the contract subheads has been correspondingly reduced. If it should happen that the work, in general, proceeds in 1924–25 without the interruptions that have caused under-spending previously, the position will be dealt with when it arises. But His Majesty's Government consider that it is reasonable to frame these Estimates on the assumption that there will not in this respect be any extensive departure from the experience of the last few years.

ADMIRALTY, CHELMSFORD.
March 10, 1924.

## NOTES ON MATTERS OF GENERAL INTEREST AFFECTING THE NAVY.

### RATIFICATION OF THE WASHINGTON TREATY.

The ratification of the Washington Treaty by all the Signatory Powers has now taken place. In the interests of economy, the Admiralty acted in anticipation of such ratification in proceeding with the sale for breaking up of the Capital Ships which under the Treaty provisions are required to be completely scrapped by February 17, 1925. All such Capital Ships are now in the hands of the shipbreakers, except one, which, having been rendered incapable of further warlike service, will be used for certain experiments before being finally scrapped.

### DOMINION CO-OPERATION.

The naval defence of the Empire must depend ultimately on the active support of public opinion throughout the Empire, and the only system of naval defence which can meet with general approval is one in which each Dominion possesses naval forces of its own. The Admiralty heartily endorse this principle and will do all in their power to assist in the development of seagoing Dominion navies.

A large proportion of the personnel (both officers and men) of the Dominion navies is at present lent from the Royal Navy. It is the policy of the Admiralty to regard service in these navies as in every way the same as service in the Royal Navy from the point of view of promotion and advancement.

The Imperial Conference in 1923 afforded a means of fully discussing with the Dominion Premiers the various aspects of Empire Naval Defence.

The resolutions of the Conference on this subject (contained in Command Paper 1987) were as follows :—

"(1) The Conference affirms that it is necessary to provide for the adequate defence of the territories and trade of the several countries comprising the British Empire.

"(2) In this connection, the Conference expressly recognizes that it is for

> the Parliaments of the several parts of the Empire, upon the recommendations of their respective Governments, to decide the nature and extent of any action which would be taken by them."

Subject to these resolutions, the Conference suggested the following guiding principles, which are of so great importance that those affecting naval defence are quoted at length :—

> (*a*) The primary responsibility of each portion of the Empire represented at the Conference for its own local defence.
>
> (*b*) Adequate provision for safeguarding the maritime communications of the several parts of the Empire, and the routes and waterways along and through which their armed forces and trade pass.
>
> (*c*) The provision of naval bases and facilities for repair and fuel so as to ensure the mobility of the fleets.
>
> (*d*) The desirability of the maintenance of a minimum standard of naval strength, namely, equality with the naval strength of any foreign power, in accordance with the provisions of the Washington Treaty on Limitation of Armament as approved by Great Britain, all the self-governing Dominions and India.

During the discussions which took place, the Admiralty pointed out that the application of these principles involved an unduly heavy burden for the people of Great Britain to bear unaided, and that the necessary naval strength can only be maintained by the co-operation of all the peoples of the Empire through their several Parliaments and Governments.

Opportunity was taken of the return of the Atlantic Fleet from the Autumn Exercises to arrange an assembly of the fleet at Spithead, to which the various delegations from the Dominions were invited by His Majesty's Government. The programme included an inspection of the fleet at anchor, and certain exercises and evolutions at sea.

The Dominion of New Zealand having expressed willingness to maintain a modern oil-burning light cruiser in place of H.M.S. Chatham, the latter has been replaced by H.M.S. Dunedin on the New Zealand Station.

With a view to the stimulation of trade, the fostering of Dominion interest in naval defence and to give His Majesty's ships more experience of long-distance cruises and of waters practically unvisited by His Majesty's Navy for nearly twenty years, a Special Service Squadron, consisting of the battle-cruisers Hood and Repulse and five light cruisers, was formed to undertake a cruise round the world, and to visit the Dominions and other parts of the British Empire. The squadron sailed in November last and the visits paid have so far proved very successful.

By arrangement with the Commonwealth Government, H.M.A.S. Adelaide, one of the light cruisers of the Royal Australian Navy, will join company with the Special Service Squadron in Australian Waters, and will accompany the squadron during the remainder of the cruise. On the arrival of the squadron in England, H.M.A.S. Adelaide will remain in Home Waters for a month before returning to Australia.

## GENERAL NAVAL ACTIVITIES.

The conclusion of a satisfactory agreement with the Soviet Government made it possible in June, 1923, to withdraw the Sloop Patrol which was instituted for the protection of British fishing vessels during the fishing season off the Murmansk Coast.

The conclusion of the Treaty of Peace with Turkey has made it possible for the naval base established at Constantinople to be closed.

At the time of the disastrous earthquake in Japan, the Commander-in-Chief with a number of ships of the China Squadron proceeded to Japan with food and medical supplies and rendered assistance.

Owing to the disturbed conditions in China, heavy demands have been made on the gunboats maintained in the Yangtse River for the protection of British interests.

In view of the revolutionary outbreak in Mexico, it has been necessary to send one of His Majesty's ships to Mexican Waters to protect British subjects.

Last month a light cruiser was detailed to convey the Prime Minister of the Commonwealth of Australia from Constantinople to Gallipoli on a visit of inspection to the War Graves in the Peninsula.

## DISTRIBUTION OF THE FLEET.

For many years prior to the late war it had been necessary to retain most of the more modern vessels in Home Waters, in spite of the fact that we were thereby depriving them of the valuable experience given by visiting more distant waters.

The general strategic situation now permits us to return to more normal conditions.

In the Mediterranean two destroyer flotillas have been replaced by more modern vessels, and His Majesty's Fleet in these waters will be gradually brought up to the following, the Atlantic Fleet being correspondingly reduced :—

8 Battleships.
2 Light Cruiser Squadrons
4 Destroyer Flotillas.
2 Depôt Ships.
2 Aircraft Carriers.
1 Fleet Repair Ship.
1 Submarine Flotilla.
1 Submarine Depôt Ship.

As the East Indies Squadron can be more satisfactorily and economically maintained from Trincomali than from Bombay, the headquarters of the squadron has been transferred to Trincomali.

### PERSONNEL OF THE FLEET.

The numbers required for the existing fleet are 99,100.

The manning of the ships already under construction or reconstruction (viz. : Nelson, Rodney, Courageous, Glorious, Emerald, Adventure, and two patrol submarines) would, under ordinary circumstances, necessitate the provision of 3,200 additional officers and men.

In view, however, of the urgent need for economy, only 1,400 of this 3,200 (being ratings who require a period of training) will be provided for by new entries. The remaining 1,800 will be found by reducing the existing peace complements of the fleet.

As regards the five cruisers and two torpedo boat destroyers, for the commencement of which provision is made in the Estimates, the effect on fleet numbers must depend upon the decisions come to on the Replacement Programme as a whole, which is to be the subject of investigation by His Majesty's Government. In the meantime the numbers in present Vote A do not include any additions in respect of these vessels.

The 1,140 officers and men retained in Vote A for a possible Naval Air Arm, mentioned in the First Lord's Statement last year, are being absorbed in the ordinary fleet numbers for 1924–25.

The Corps of Royal Marines, which stood at 18,400 before the war, has been reduced to 9,940, including the Royal Naval School of Music. This rendered it essential to reduce the overhead charges for maintenance. Various schemes were considered by the Board, and it was eventually decided, with the approval of His Majesty the King, to effect the necessary economies by amalgamating the Royal Marine Artillery and the Royal Marine Light Infantry under the title of Royal Marines. As a result of this step, it has been possible to close the Portsmouth Division, R.M.L.I., at Forton.

Officers' Lists have been unified on principles calculated to produce smooth working and to inflict as little hardship as possible on individual officers, and surplus officers have been allowed to retire on special terms.

Non-commissioned officers and men required to transfer to the Chatham and Plymouth Divisions were obtained by calling for volunteers, of whom a considerable number came forward, the residue required to make up the revised establishments being provided proportionately from Royal Marine Artillery and Royal Marine Light Infantry. In order to reduce the hardship which would be inflicted on married men, when effecting compulsory transfers, unmarried men were selected as far as possible, and in all transfers of officers and men arrangements were made for removal of families and effects at the public expense.

Further accommodation in Training Establishments has been necessitated by the resumption of normal entries of boys, which have been much reduced during the period of reduction of fleet numbers since the war.

His Majesty's ships Colossus and King George V. have accordingly been temporarily attached to Impregnable to provide accommodation for additional numbers of boys, but such arrangements are costly, and it is intended, in the interests of economy, to provide permanent accommodation on shore in the barracks vacated by the Royal Marines at Forton as soon as they can be suitably adapted.

### MEASURES TAKEN DURING THE PAST WINTER TO PLACE ORDERS AT THE EXPENSE OF NAVY ESTIMATES IN RELIEF OF UNEMPLOYMENT.

At the request of the late Government, the Admiralty placed orders with contractors in what are known as the "black spot" areas of unemployment for purchase of materials and stores of all descriptions that were not provided for in the original Estimates, of a value of nearly £500,000, which were expected to give employment to some 7,000 men for seventeen weeks. It was later decided to place orders for various items of machinery of a value of over £400,000 for the same purpose, but it has not been possible to place these contracts in time for much of the money to be spent before the end of March. To meet the particular needs of Barrow-in-Furness, which is one of the most distressed of all the districts, orders were given to re-condition a large number of gun mountings which are held in reserve, at a cost of over £100,000: the number of men engaged being about 600. It was further decided to enter 2,500 additional men in the dockyards and 1,000 men at the Naval Ordnance Depôts on arrears of work which had been deferred for reasons of economy. The cost up to the end of March is estimated to be about £270,000. The whole of this special expenditure can be met within the total of Navy Estimates, 1923–24, the boilermakers' dispute having resulted in normal expenditure to more than the same amount being postponed.

## REMARKS ON THE VOTES FOR 1924–25.

*Vote* 1 (*Pay of the Fleet*).

*Vote* 2 (*Victualling and Clothing*).

*Vote* 3 (*Medical*).

*Vote* 4 (*Civilians employed on Fleet Services*).

Reduction on the 4 Votes—£362,300.

The much larger decrease in 1923–24 Estimates on this group of Votes, which are those most closely connected with fleet numbers, was in consequence of the heavy reduction in the numbers of naval personnel, and naturally it is not repeated in the Estimates for 1924–25.

Allowance has been made for a reduction in officers' pay, which is expected to result from the revision of the rates during 1924 on the basis of the cost of living, as provided for by the Jerram Committee's recommendations when the rates were raised in 1919.

The number of Medical Establishments has been reduced by two, viz.: Yokohama Hospital, destroyed by the earthquake, and Royal Marine Infirmary, Forton, closed owing to the transfer of the R.M. Division.

A further reduction in the number and cost of civilians employed on Fleet Services has been effected.

*Vote* 5 (*Education*).

Reduction—£11,200.

It is satisfactory to note that, in a large measure as the result of the improved rates of pay for schoolmasters, the shortage of numbers in this branch, as in the Instructor Branch, has nearly been made good. It thus becomes possible to make much fuller progress with the schemes for the continuous education of young officers and men of the fleet.

An important change affecting the training of cadets and involving a considerable saving, though chiefly under other Votes, has been made by the decision to abolish the Cadet Training Ship. In future, Cadets will proceed direct from Dartmouth to Capital Ships, where their further instruction will be carried out by instructor officers and other specialist officers.

*Vocational Training.*—As was forecasted in last year's statement, arrangements have been made to institute at the home ports a system of vocational training in trades suitable to the various branches of the naval service, the cost being partly defrayed by fees paid by the men under instruction and partly from public funds. Arrangements are also made for the attendance of men at classes at the Municipal Technical Schools when the subjects taught appear to be suitable to the needs of the men, one half of the fees for such classes being defrayed from public funds.

Preference is given to men who are within twelve months of completing time for pension. Facilities are also extended to men invalided from the Service, provided they can complete the course within a year of discharge.

Commanders-in-Chief on foreign stations are authorized to put similar schemes into operation so far as local conditions permit.

*Vote* 6 (*Scientific Services*).

Increase—£4,200.

Reference was made in last year's Statement to the proposed pooling of scientific staffs employed by the Admiralty. The scientific pool has now been formed and the work of these scientists, in co-operation with the technical officers in Service establishments, should enable the most urgent of the continually increasing number of scientific problems to be investigated most economically.

These staffs are intended to meet the requirements in general research for the Navy, the specific items of research varying in accordance with policy.

The actual numbers in the scientific pool are based upon the minimum rate of progress considered to be essential. The need for effective methods of countering new offensive weapons is particularly borne in mind, and the results obtained are encouraging.

*Vote* 7 (*Reserves*).

Reduction—£81,300.

The reduction is mainly due to the fact that experience has shown that neither the numbers enrolling in the Reserves nor the numbers coming up for voluntary training have realized expectations. These are probably direct and temporary results of the war.

It has further been decided on grounds of economy to exempt from drill during 1924 half the number of Royal Fleet Reservists, Class B, who would normally be liable to perform training. As far as possible, this will be effected by waiving the drill of (*a*) the older Reservists in preference to the younger; (*b*) men who wish for exemption in preference to men who wish to drill.

As announced last year, arrangements have been made for the formation of a new division of the R.N.V.R. in Ulster, starting from the commencement of 1924–25.

It is to be regretted that considerations of economy make it necessary to discontinue the capitation grant of 6*s*. per annum hitherto payable to central associations for each efficient Cadet in recognized naval units of Sea Cadet Corps under their administration. Since December, 1922, only units already recognized before that date have been receiving the grant.

Admiralty assistance to Sea Cadet Corps, from April 1, 1924, will be confined to the loan of boats, stores, etc., subject to insurance by the unit concerned where the value of articles lent justifies that course.

*Vote* 8, *Section I.* (*Dockyard Personnel*).

Increase—£351,000.

The labour conditions in the dockyards during the current financial year have been generally stable, and no discharges on reduction have occurred.

Under the scheme for the relief of unemployment, a number of additional men were entered in the yards on a temporary basis early in the winter and have been engaged on useful and necessary work. It was originally intended to dispense with their services by the end of the financial year, but if three new cruisers are laid down in the dockyards, as proposed, this will obviate the necessity for a general discharge.

As regards the progress of the work of the yards, the aircraft-carriers Hermes and Eagle are being completed and passed into commission during the current year.

The submarines K.26 and L.69 have also been completed and commissioned, while submarine X.1 is expected to be completed very early in 1924–25, if her trials prove satisfactory.

Substantial progress has been made during the current year on ships under re-construction.

The programme for 1924–25 includes the completion of the following ships laid down before the end of the war: the cruisers Effingham, Frobisher, and Emerald, the flotilla leaders Keppel and Broke, three destroyers and five submarines.

The construction of the cruiser Enterprise, the minelayer Adventure, and submarine O.1 will be further advanced.

*Vote* 8, *Section II.* (*Store Subheads*).

Reduction—£102,300.

The reduction in spite of provision for the programme of new construction would have been more than doubled were it not for the falling off in the credits from the sale of ships. Administrative reorganization in the supply of sea stores to the fleet, which has been extended during the current year, is largely responsible for this decrease in expenditure.

*Vote* 8/*II*/*K.* (*Fleet Fuelling*).

Reduction—£488,000.

In view of the continued pressing need for economy, the policy referred to in last year's Statement of restriction of the steaming and of the fuelling facilities of the fleet and postponement of the building up of oil fuel reserves will be again followed in 1924–25.

*Vote* 8, *Section III.* (*Contract Shipbuilding*).

Increase—£788,850.

The increase is due to provision being made for the contract work in connection with the five cruisers and two destroyers proposed to be laid down in 1924–25. Although three of the cruisers are intended to be built in the Royal Dockyards, their armour and gun-mountings will be obtained by contract and will be a charge against this Vote.

Progress on the battleships Nelson and Rodney was greatly retarded in 1923–24 owing to the boilermakers' dispute, and, in accordance with the policy referred to at the conclusion of the First Lord's statement, the provision made for progress on these ships in 1924–25 has been estimated on a very conservative basis.

*Vote* 9 (*Naval Armaments*).

Reduction—£1,369,400.

A large reduction has been made on this Vote, the experience of recent years having shown that there is difficulty in maintaining the standard of progress aimed at in the supply of armament stores and in experimental services.

War liabilities are now practically cleared off under this Vote. On the other hand, surplus stocks of high explosives are no longer available to meet current requirements.

*Vote* 10 (*Works*).

Reduction—£752,850.

The annuity under the Naval Works Acts accounts for £1,286,114 of the total Vote of £3,080,000.

The sum of £648,600 is included for continuing the programme of oil fuel storage accommodation at home and abroad. Provision is made for commencing the Pembroke installation.

Other new works have been reduced to an essential minimum, the most important being at Devonport, where the widening of the entrance into the basin at Devonport and the provision of a berth for a floating dock, to enable bulged ships to be dealt with at that dockyard, will be taken in hand. Provision is also made for the conversion of the barracks at Forton, lately vacated by the Royal Marines, into a training establishment for boys for whom accommodation cannot be found in the Shotley establishment; for the storage underground, in the interests of safety, of high explosives in the Plymouth district; and for commencing the restoration of important buildings in Portsmouth dockyard destroyed by fire before the war.

*Vote* 11 (*Travelling Expenses and Miscellaneous*).

Reduction—£203,500.

Considerable reductions have been made in the majority of the subheads of this Miscellaneous Vote, partly due to the clearance, either wholly or in part, of the various war-time and other abnormal services. A marked reduction in the provision for travelling has been made, partly due to the use of His Majesty's ships for relieving naval crews abroad.

*Vote* 12 (*Admiralty Office*).

Reduction—£50,900.

The total reduction of numbers borne on the Vote is 247.

Completion of the greater part of the prize and medal distribution has enabled a considerable reduction to be made. Further reductions in the staff engaged on the prize and medal work still remaining will be made during the course of the financial year.

Reductions have also been possible through the completion of other financial work arising as an aftermath of the war.

A considerable reduction has also been effected in the number of temporary staff and of the messenger and cleaning staff.

*Votes* 13, 14, 15 (*Non-effective Votes*).

Increase—£77,700.

The natural tendency of the non-effective Votes to increase in consequence of the improved scales granted since the war, is to some extent offset in the case of Vote 13 by the expected reduction in July, 1924, of that portion of officers' rates of pay which is related to the cost of living and, in the case of Vote 14, by the clearance of charges relating to the war period. The increase in Vote 15 is partly due to the effect of the new Workmen's Compensation Act, passed in December last.

# ABSTRACT OF THE NAVY ESTIMATES, 1924–25.

| Votes. | | Estimates for 1924-1925. Gross Estimate. | Estimates for 1924-1925. Net Estimate. | Estimates, 1923-1924. Net Estimate. |
|---|---|---|---|---|
| | I.—NUMBERS. | | Maximum Numbers. | Maximum Numbers. |
| A. | Number of Officers, Seamen, Boys, and Royal Marines | 100,500 | 100,500 | 99,500 |
| | Number of Coast Guard and Marine Police | 287 | 287 | 1,423 |
| | II.—EFFECTIVE SERVICES. | £ | £ | £ |
| 1 | Wages, etc., of Officers, Seamen, and Boys, Coast Guard, and Royal Marines | 14,332,900 | 14,245,000 | 14,055,700 |
| 2 | Victualling and Clothing for the Navy | 5,177,126 | 4,258,100 | 4,742,500 |
| 3 | Medical Establishments and Services | 494,239 | 462,500 | 516,000 |
| 4 | Civilians employed on Fleet Services | 182,386 | 181,200 | 194,900 |
| 5 | Educational Services | 398,743 | 341,800 | 353,000 |
| 6 | Scientific Services | 498,472 | 440,000 | 435,800 |
| 7 | Royal Naval Reserves | 493,525 | 491,500 | 572,800 |
| 8 | Shipbuilding, Repairs, Maintenance, etc.: | | | |
| | Section I.—*Personnel* | 7,110,083 | 7,045,000 | 6,694,000 |
| | Section II.—*Matériel* | 7,317,900 | 5,397,900 | 5,988,200 |
| | Section III.—Contract Work | 5,935,272 | 5,820,300 | 5,031,450 |
| 9 | Naval Armaments | 4,335,793 | 3,975,500 | 5,344,900 |
| 10 | Works, Buildings, and Repairs at Home and Abroad | 3,230,000 | 3,080,000 | 3,832,850 |
| 11 | Miscellaneous Effective Services | 925,090 | 856,100 | 1,059,600 |
| 12 | Admiralty Office | 1,235,276 | 1,229,500 | 1,280,400 |
| | Total Effective Services . £ | 51,666,805 | 47,824,400 | 50,102,100 |
| | III.—NON-EFFECTIVE SERVICES. | | | |
| 13 | Naval and Marine, Officers | 2,903,167 | 2,884,300 | 2,844,900 |
| 14 | Naval and Marine, Men | 4,285,055 | 4,253,500 | 4,260,800 |
| 15 | Civil Superannuation, Compensation Allowances, and Gratuities | 838,224 | 837,800 | 792,200 |
| | Total Non-Effective Services . £ | 8,026,446 | 7,975,600 | 7,897,900 |
| | GRAND TOTAL . . £ | 59,693,251 | 55,800,000 | 58,000,000 |

NET DECREASE . . . . . £2,200,000.

CHELMSFORD.
BEATTY.
H. F. OLIVER.
C. FULLER.

ALGERNON D. BOYLE.
ROGER KEYES.
A. K. WAISTELL.
FRANK HODGES.

ADMIRALTY,
*March* 4, 1924.

CHARLES G. AMMON } Secretaries.
O. MURRAY }

## STATEMENT SHOWING THE NUMBERS BORNE, THE EXPENDITURE ON NAVAL SERVICES FOR THE YEARS 1914-1915 TO 1922-1923, AND THE ESTIMATES FOR 1923-1924 AND 1924-1925.

| YEAR. | VOTE A. — Average numbers borne. | VOTE 1. — Wages, &c., of Officers, &c. | VOTE 2. — Victualling and Clothing. | VOTE 3. — Medical Establishments, &c. | VOTE 4. — Civilians employed on Fleet Services. | VOTE 5 — Educational Services. | VOTE 6. — Scientific Services. | VOTE 7. — Royal Naval Reserves. | VOTE 8. — Shipbuilding, Repairs, Maintenance, &c. Section I. Personnel. | VOTE 8. Section II. Matériel. | VOTE 8. Section III. Contract Work. | VOTE 9. — Naval Armaments. | VOTE 10. — Works. | VOTE 11. — Miscellaneous. | VOTE 12 — Admiralty Office. | VOTE 13. — Half Pay, &c. | VOTE 14. — Naval, &c., Pensions. | VOTE 15. — Civil Superannuation, &c. | Balances Irrecoverable. | Total Expenditure. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ | £ |
| 1914-15 | 151,000 | 8,926,000 | 3,863,662 | 309,773 | 115,500 | 242,857 | 99,648 | 493,108 | 4,016,200 | 7,736,800 | 14,380,760 | 5,667,550 | 3,632,000 | 532,034 | 492,642 | 1,027,816 | 61,637,151 | 399,760 | — | 53,573,261<br>(c) |
| 1915-16 | 297,008 | 24,321,519 | 10,796,024 | 578,703 | 444,907 | 171,610 | 108,535 | 755,201 | 7,868,812 | 44,778,970 | 64,513,255 | 25,649,203 | 5,710,782 | 16,321,128 | 851;066 | 717,519 | 1,73 0,117 | 400,161 | 17,085 | 205,733,597 |
| 1916-17 | 349,578 | 29,399,358 | 11,173,592 | 713,525 | 517,209 | 201,497 | 110,478 | 863,943 | 8,943,491 | 40,952,653 | 53,982,842 | 36,742,534 | 6,694,878 | 15,460,001 | 1,024,106 | 713,621 | 1,944,003 | 388,509 | 50,976 | 209,877,218 |
| 1917-18 | 406,977 | 37,559,536 | 13,481 159 | 792,569 | 561,308 | 210,243 | 152,160 | 874,930 | 12,660,160 | 36,494,694 | 70,609,055 | 34,177,359 | 6,556,769 | 9,193,802 | 1,454,835 | 709,227 | 1,446,247 | 413,746 | 41,092 | 227,388,891 |
| 1918-19 | 381,311 | 46,373,511 | 24,219,351 | 1,158,287 | 491,270 | 247,922 | 262,886 | 871,970 | 15,037,763 | 59,128,675 | 94,248,874 | 64,866,784 | 10,928,241 | 9,357,532 | 1,985,894 | 704,914 | 3,733,778 | 445,485 | 28,090 | 334,091,227 |
| 1919-20 | 176,087 | 32,385,306 | 8,823 106 | 733,046 | 556,778 | 401,864 | 364,832 | 458,044 | 12,426,177 | *Credit :—*<br>*785,986* | 48,348,933 | 14,441,835 | 5,595,608 | 11,118,631 | 2,042,715 | 1,176,937 | 15,133,064 | 802,279 | 60,875 | 154,084,044 |
| 1920-21 | 124,009 | 21,314,360 | 8,311,708 | 683,830 | 759,110 | 503,152 | 249,185 | 359,694 | 12,096,747 | 6,799,965 | 12,001,445 | 8,493,951 | 4,992,969 | 5,724,974 | 2,073,764 | 2,352,344 | 4,847,475 | 880,996 | 23,611 | 92,505,290 |
| 1921-22 | 127,180 | 19,220,859 | 6,831,481 | 643,735 | 480,243 | 405,592 | 359,575 | 423,056 | 10,690,188 | 8,835,771 | 4,834,336 | 6,253,468 | 4,746,485 | 3,506,514 | 1,780,641 | 2,002,201 | 3,881,368 | 1,020,693 | 69,935 | 75,986,141 |
| | | | | | | | | | | | | | | | | Non-effective Services. Officers. | Non-effective Services. Men. | | | |
| 1922-23 | 107,782 | 15,762,232 | 4,767,118 | 492,419 | 258,600 | 382,065 | 354,961 | 423,722 | 7,075,533 | 3,877,716 | 3,225,598 | 3,678,783 | 3,553,831 | 2,096,219 | 1,371,961 | 3,701,984 | 5,471,088 | 968,860 | 29,670 | 57,492,389 |
| 1923-24 (Estimate) | 100,923(*a*) | 14,055,700 | 4,742,500 | 516,000 | 194,900 | 353,000 | 435,800 | 572,800 | 6,694,000 | 5,938,200 | 5,031,450 | 5,344,900 | 3,832,850<br>✓ | 1,059,600 | 1,280,400 | 2,844,900 | 4,260,800 | 792,200 | — | 58,000,000 |
| 1924-25 (Estimate) | 100,787(*b*) | 14,245,000 | 4,258,100 | 462,500 | 181,200 | 341,800 | 440,000 | 491,500 | 7,450,000 | 5,397,900 | 5,820,300 | 3,975,500 | 3,080,009 | 856,100 | 1,229,500 | 2,884,300 | 4,253,500 | 837,800 | — | 55,800,000 |

*Note.*—The figures under Vote 9 include the cost of **Naval Aviation** Services from the year 1916-1917 to the year 1919-1920 inclusive.

(*a*) Maximum for the year, including Coast Guard and Marine Police.

(*b*) Maximum for the year, including Marine Police.

(*c*) Total gross estimate.

# EXPENDITURE FOR NAVAL PURPOSES OF THE PRINCIPAL FOREIGN POWERS.

## UNITED STATES NAVY.

### APPROPRIATION ACT, July 1, 1924, to June 30, 1925.

| | | 1924-1925. Dollars. | 1923-1924. Dollars. |
|---|---|---|---|
| Naval Secretary's Department, including various out-stations and Office of Naval Operations | | 4,255,630 | 3,816,000 |
| Bureau of Navigation, including Transport and Recruiting | $3,600,000 | | |
| Naval Reserve | 3,570,000 | | |
| Hydrographic Office, Observatory, etc. | 559,400 | 10,832,480 | 10,940,170 |
| Bureau of Engineering | | 18,008,800 | 14,869,000 |
| Bureau of Construction and Repairs | | 15,918,000 | 16,074,000 |
| Bureau of Ordnance | | 10,984,600 | 10,753,000 |
| Bureau of Supplies and Accounts: | | | |
| Pay of the Navy | $117,000,000 | | |
| Maintenance, freight, fuel, etc. | 34,730,000 | | |
| | | 151,730,000 | 164,700,892 |
| Bureau of Medicine and Surgery | | 2,347,620 | 2,325,000 |
| Bureau of Yards and Docks | | 9,097,980 | 8,830,190 |
| Bureau of Aeronautics | | 15,328,500 | 14,793,560 |
| Naval Academy | | 1,976,157 | 2,122,848 |
| *Marine Corps: | | | |
| Pay | $16,482,639 | | |
| Quartermaster's Department | 9,082,661 | | |
| | | 25,565,300 | 25,495,948 |
| †Increase of the Navy | | 8,450,000 | 19,097,000 |
| Total | | 274,495,067 | 293,817,608‡ |

* The United States Navy having its own Air Service, the pay of personnel, etc., is included under heading of Pay of the Navy.

† In addition, unexpended balances are to be added to this item for necessary work.

‡ The par rate of exchange is $4·866 to the £.

## IMPERIAL JAPANESE NAVY.

### ESTIMATES, 1924–25.

The Estimates of the Imperial Japanese Navy are divided under two headings, "Ordinary" and "Extraordinary."

The figures for 1924–25 as compared with the previous year are as follows:—

| | 1924-25. Yen. | 1923-24. Yen. |
|---|---|---|
| Ordinary | 126,300,000 | 125,183.959 |
| Extraordinary | 112,200,000 | 151,445,123 |
| Total | 238,500,000 | *276,629,082 |

The "Ordinary" expenditure is for pay, provisions, etc., and the general upkeep of the Fleet and its Air Service, and the "Extraordinary" expenditure for new construction and additions and improvements to the present Fleet and its Air Service and establishments.

In addition Supplementary Estimates were put forward, covering a ten-year programme of rebuilding and replacement of arms and munitions destroyed by earthquake, amounting to 892,000,000 yen.

* The par rate of exchange is 9·75 yen to the £.

## FRENCH NAVY.

### ESTIMATES, 1924–25.

The Estimates of the French Navy are shown divided under two headings, "Ordinary" and "Extraordinary."

The figures for 1924-25, including the votes for new construction, as compared with the previous year are as follows :—

| | 1924-25. Francs. | 1923-24. Francs. |
|---|---|---|
| Ordinary | 1,019,283,600 | 1,005,437,008 |
| Extraordinary | 32,800,000 | 22,800,000 |
| Total | 1,052,083,600 | 1,028,237,008 * |

* The par rate of exchange is 25·225 frs. to the £.

## ROYAL ITALIAN NAVY.

### ESTIMATES, 1924–25.

| | 1924-25. Lire. | 1923-24. Lire. |
|---|---|---|
| ORDINARY EXPENDITURE. | | |
| General Expenses | 4,646,400 | 4,490,885 |
| Pensions | 54,070,000 | 32,030,000 |
| Education | 3,735,600 | 2,990,000 |
| Lighthouses and Pilotage | 5,603,000 | 4,235,000 |
| Maintenance, Construction, Armaments, Establishments, and Coast Works | 807,017,800 | 660,225,800 |
| Total | 875,072,800 | 703,971,685 |
| EXTRAORDINARY EXPENDITURE. | | |
| General and Various | 49,973,230 | 66,593,330 |
| FLOATING CREDIT | — | 3,051,647 |
| Total | 925,046,030 | 773,616,662 |

* The par rate of exchange is 25·225 lire to the £.

# BRITISH AND FOREIGN NAVAL ATTACHÉS.

## BRITISH NAVAL ATTACHÉS ACCREDITED TO FOREIGN COUNTRIES.

To:—

Albania, Bulgaria, Greece, Italy, Roumania, Serbia, and Turkey: Naval Attaché, Commander Reginald T. Down, C.V.O., D.S.O. (appointed 20th July, 1922); Headquarters, Rome, Italy.

Belgium, France, Poland, Portugal and Spain: Naval Attaché, Commander Edward B. C. Dicken, D.S.C. (appointed 20th September, 1922); Headquarters, Paris, France.

Denmark, Esthonia, Finland, Latvia, Netherlands, Norway and Sweden: Naval Attaché, Captain Wion M. Egerton (appointed 15th February, 1923); Headquarters, Helsingfors, Finland.

Japan and China: Naval Attaché, Captain Guy C. Royle, C.M.G. (appointed 5th January, 1924): Headquarters, Tokyo, Japan.

North and Central America, including Costa Rica, Cuba, Haiti, Honduras, Mexico, Nicaragua, Panama, Salvador, San Domingo, and the United States: Naval Attaché, Captain Francis L. Tottenham, C.B.E. (appointed 4th October, 1922); Assistant Naval Attaché, Engineer-Commander Harold A. Brown (appointed 15th July, 1921): Headquarters, Washington, D.C., U.S.A.

South America, including the Argentine Republic, Brazil, Chile, Columbia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela: Naval Attaché, Captain Gerard A. Wells (appointed 8th June, 1923).

## FOREIGN NAVAL ATTACHÉS ACCREDITED TO GREAT BRITAIN.

From:—

Argentine Republic: Naval Attaché, Commander Jorge Games: Address, Argentine Legation, 30, Grosvenor Gardens, London, S.W.1.

Brazil: Naval Attaché, Commander Americo de Araujo Pimentel: Address, 19, Upper Brook Street, London, W.1.

Denmark: Naval Attaché, Commander C. V. Evers: Address, 29, Pont Street, London, S.W.1.

France: Naval Attaché, Capitaine de Vaisseau de Ruffi de Pontevès-Gévaudan, D.S.O.: Address, Albert Gate House, Hyde Park, London, S.W.1.

Italy: Naval Attaché, Captain Count G. A. Raineri-Biscia, C.V.O., I.R.N.: Address, 28, Norfolk Street, Park Lane, London, W.1.

Japan: Naval Attaché, Commander Teijiro Toyoda, D.S.O.; Assistant Naval Attaché, Lieut.-Commander Yorio Sawamoto: Address, Broadway Court, Broadway, Westminster, London, S.W.1.

Norway: Naval Attaché, Commander K. Prestrud: Address, Norway House, 21-24, Cockspur Street, Westminster, London, S.W.1.

Portugal: Naval Attaché, Commander Fernando Branco: Address, 12, Taviton Street, Gordon Square, London, W.C.1.

Spain: Naval Attaché, Lieut.-Commander Fernando Navarro: Address, 1, Grosvenor Gardens, Westminster, London, S.W.1.

Sweden: Naval Attaché, Commander A. H. de Bahr, C.V.O.: Address, 27, Portland Place, London, W.1.

United States of America: Naval Attaché, Captain Luke McNamee; Assistant Naval Attachés, Commander H. F. Leary, Commander John H. Towers, Commander C. Ashton Jones, and Commander J. C Hunsaker (CC): Address, 6, Grosvenor Gardens, Westminster, London, S.W.1.

# MERCHANT SHIPPING
# REFERENCE SECTION.

## MERCHANT SHIPPING OF THE WORLD.

### NUMBER AND TONNAGE OF MERCHANT VESSELS LAUNCHED.*

| | 1910. | | 1913. | | 1919. | | 1921. | | 1922. | | 1923. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. |
| Gt. Britain and Ireland | 500 | 1,143,169 | 688 | 1,932,153 | 612 | 1,620,442 | 426 | 1,538,052 | 235 | 1,031,081 | 222 | 645,651 |
| British Dominions | 60 | 26,343 | 91 | 48,339 | 263 | 358,728 | 54 | 129,675 | 39 | 62,765 | 44 | 41,263 |
| United States | 195 | 331,318 | 205 | 276,448 | 1051 | 4,075,385 | 173 | 1,006,413 | 59 | 119,138 | 83 | 172,817 |
| Austria-Hungary | 8 | 14,304 | 17 | 61,757 | — | — | — | — | — | — | — | — |
| Denmark | 18 | 12,154 | 31 | 40,932 | 46 | 37,766 | 37 | 77,238 | 23 | 41,016 | 24 | 49,479 |
| Holland | 105 | 70,945 | 95 | 104,296 | 100 | 137,086 | 98 | 232,402 | 60 | 163,132 | 35 | 65,632 |
| France | 55 | 80,751 | 89 | 176,095 | 34 | 32 663 | 65 | 210,663 | 62 | 184,509 | 27 | 96,644 |
| Germany | 117 | 159,303 | 162 | 465,226 | No returns. | | 242 | 509,064 | 195 | 575,264 | 117 | 358,273 |
| Italy | 21 | 23,019 | 38 | 50,356 | 32 | 82,713 | 85 | 164,748 | 42 | 101,177 | 21 | 66,523 |
| Japan | 70 | 30,215 | 152 | 64,664 | 133 | 611,883 | 43 | 227,425 | 49 | 83,419 | 44 | 72,475 |
| Norway | 64 | 36,931 | 74 | 50,637 | 82 | 57,578 | 35 | 51,458 | 23 | 32,391 | 48 | 42,619 |
| Russia | 14 | 4,395 | 10 | 3,300 | — | — | — | — | — | — | — | — |
| Spain | 1 | 3,234 | 12 | 8,488 | 41 | 52,609 | 11 | 47,256 | 2 | 7,776 | 7 | 4,488 |
| Sweden | 17 | 8,904 | 25 | 18,524 | 53 | 50,971 | 27 | 65,911 | 14 | 30,038 | 10 | 20,118 |
| Other Countries | 32 | 12,868 | 61 | 31,667 | 36 | 26,725 | 81 | 81,374 | 49 | 35,378 | 19 | 7,199 |
| World's Total | 1277 | 1,957,853 | 1750 | 3,332,882 | 2483 | 7,144,549 | 1377 | 4,341,679 | 852 | 2,467,084 | 701 | 1,643,181 |

* Figures given include all steamers and sailing vessels of 100 gross tons and upwards.

## MERCHANT VESSELS UNDER CONSTRUCTION.*

| | 1910. | | 1913. | | 1919. | | 1921. | | 1922. | | 1923. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. |
| Gt. Britain and Ireland . | 363 | 1,131,503 | 513 | 1,956,606 | 757 | 2,994,249 | 515 | 2,640,319 | 315 | 1,468,599 | 360 | 1,395,181 |
| British Dominions . . . | 16 | 12,231 | 38 | 38,785 | 113 | 251,480 | 34 | 66,469 | 21 | 49,245 | 19 | 33,355 |
| United States . . . . | 59 | 96,289 | 66 | 147,597 | 647 | 2,966,515 | 43 | 216,428 | 37 | 139,448 | 35 | 91,585 |
| Austria-Hungary . . . | 13 | 38,320 | 16 | 63,300 | — | — | — | — | — | — | — | — |
| Denmark . . . . . . . | 8 | 9,625 | 12 | 25,362 | 56 | 100,335 | 27 | 63,070 | 19 | 34,864 | 28 | 62,196 |
| Holland . . . . . . . | 24 | 47,620 | 41 | 126,867 | 126 | 328,338 | 123 | 313,879 | 63 | 142,969 | 45 | 112,811 |
| France . . . . . . . | 24 | 109,106 | 39 | 229,020 | 65 | 216,775 | 76 | 352,635 | 43 | 188,525 | 24 | 110,725 |
| Germany . . . . . . . | 63 | 160,932 | 102 | 544,682 | No returns. | | No returns. | | 109 | 416,081 | 92 | 324,184 |
| Italy . . . . . . . . | 6 | 15,505 | 23 | 53,809 | 125 | 314,547 | 122 | 393,832 | 65 | 211,499 | 38 | 119,663 |
| Japan . . . . . . . | 28 | 33,058 | 14 | 47,797 | 64 | 309,474 | 35 | 144,912 | 30 | 93,831 | 20 | 63,207 |
| Norway . . . . . . . | 27 | 20,920 | 49 | 42,614 | 61 | 92,719 | 40 | 61,559 | 28 | 40,946 | 29 | 33,735 |
| Russia . . . . . . . | — | — | 1 | 5,620 | — | — | — | — | — | — | — | — |
| Spain . . . . . . . . | 1 | 3,838 | 3 | 6,855 | 28 | 107,463 | 16 | 69,937 | 16 | 50,617 | 10 | 23,065 |
| Sweden . . . . . . . | 7 | 11,585 | 18 | 18,400 | 67 | 110,765 | 33 | 78,269 | 18 | 43,356 | 19 | 43,159 |
| Other Countries . . . . | 14 | 8,580 | 19 | 23,829 | 29 | 68,703 | 62 | 55,784 | 51 | 74,338 | 40 | 31,470 |
| World's Total . . | 653 | 1,699,112 | 954 | 3,331,143 | 2138 | 7,861,363 | 1126 | 4,457,093 | 815 | 2,954,318 | 759 | 2,444,736 |

* The figures give the number and aggregate gross tonnage of steamers, motor ships, and sailing vessels under construction on December 31st of each year.

## ANNUAL MERCHANT SHIPPING LOSSES OF THE WORLD.*

| | 1910. | | | 1913. | | | 1919. | | | 1921. | | | 1922. | | | 1923. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Tonnage. | % of Tonnage owned. | No. | Tonnage. | % of Tonnage owned. | No. | Tonnage. | % of Tonnage owned. | No. | Tonnage. | % of Tonnage owned. | No. | Tonnage. | % of Tonnage owned. | No. | Tonnage. | % of Tonnage owned. |
| Gt. Brit. & Ireland | 129 | 222,069 | 1·27 | 113 | 199,453 | 1·07 | 99 | 151,653 | ·92 | 74 | 72,104 | ·37 | 83 | 122,088 | ·63 | 88 | 140,335 | ·73 |
| British Dominions | 44 | 27,858 | 1·86 | 37 | 20,091 | 1·16 | 89 | 52,539 | 2·56 | 82 | 58,687 | 2·35 | 43 | 20,602 | ·75 | 53 | 31,181 | 1·12 |
| United States . . | 75 | 50,996 | 1·82 | 91 | 71,469 | 2·38 | 115 | 150,272 | 1·15 | 72 | 107,145 | ·73 | 72 | 94,387 | ·64 | 62 | 99,905 | ·68 |
| Austria-Hungary . | 2 | 3,210 | ·41 | 3 | 5,536 | ·55 | — | — | — | — | — | — | — | — | — | — | — | — |
| Denmark . . . | 11 | 9,506 | 1·29 | 13 | 6,583 | ·86 | 15 | 5,295 | ·75 | 13 | 8,386 | ·87 | 9 | 8,281 | ·80 | 10 | 8,071 | ·81 |
| Holland . . . | 4 | 8,121 | ·80 | 4 | 1,340 | ·10 | 23 | 11,550 | ·73 | 2 | 602 | ·03 | 7 | 5,167 | ·20 | 5 | 10,817 | ·41 |
| France . . . . | 31 | 20,789 | 1·10 | 30 | 34,506 | 1·57 | 34 | 40,420 | 1·81 | 39 | 37,956 | 1·04 | 38 | 33,204 | ·86 | 38 | 18,011 | ·48 |
| Germany . . . | 39 | 44,233 | 1·02 | 31 | 56,379 | 1·11 | 50 | 24,167 | — | 22 | 11,265 | 1·57 | 33 | 27,408 | 1·45 | 36 | 43,266 | 1·66 |
| Italy . . . . | 17 | 18,534 | 1·40 | 26 | 26,881 | 1·77 | 8 | 3,096 | ·23 | 27 | 33,090 | 1·25 | 27 | 33,908 | 1·18 | 32 | 55,702 | 1·82 |
| Japan . . . | 22 | 21,505 | † | 25 | 25,514 | † | 38 | 41,418 | † | 29† | 51,185† | 1·53† | 64† | 54,136† | 1·51† | 33† | 58,548† | 1·62† |
| Norway . . . | 73 | 67,971 | 3·37 | 61 | 60,648 | 2·47 | 41 | 44,132 | 2·37 | 27 | 46,829 | 1·81 | 29 | 27,068 | 1·04 | 30 | 40,109 | 1·57 |
| Russia . . . | 31 | 19,441 | 2·19 | 29 | 23,894 | 2·45 | 4 | 4,771 | 88 | — | — | — | — | — | — | — | — | — |
| Spain . . . . | 15 | 17,599 | 2·30 | 13 | 15,928 | 1·89 | 16 | 9,752 | 1·30 | 35 | 55,560 | 4·77 | 25 | 29,741 | 2·30 | 13 | 11,862 | ·94 |
| Sweden . . . . | 31 | 15,260 | 1·66 | 30 | 17,327 | 1·65 | 38 | 29,021 | 2·92 | 13 | 11,854 | 1·02 | 12 | 7,304 | ·65 | 27 | 14,645 | 1·21 |
| Other Countries . | 38 | 44,444 | — | 36 | 42,686 | — | 65 | 54,719 | — | 68 | 86,163 | — | 63 | 53,417 | — | 39 | 44,120 | — |
| World's Total . | 562 | 591,536 | — | 542 | 608,235 | — | 635 | 622,805 | | 503 | 580,826 | — | 505 | 516,711 | — | 466 | 576,572 | — |

---

* Figures refer to steamers, motor ships, and sailing vessels of 100 gross tons and over totally lost, condemned, etc. The tonnage given is gross for steamers and motor ships and net for sailing ships up to and including the returns for 1919; in subsequent returns the tonnage is gross for all classes of vessels.

† Japanese sailing vessels not included.

## LARGEST STEAMERS OF THE WORLD.

| Gross Tonnage. | Name. | Speed (knots). | Built. | Flag. | Owners. | Registered Dimensions.* | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Length. | Breadth. | Depth. |
| | | | | | | ft. | ft. | ft. |
| 59,957 | Leviathan (*ex*-Vaterland) | 23 | 1914 | United States | U.S. Shipping Board | 907·6 | 100·3 | 58·2 |
| 56,551 | Majestic (*ex*-Bismarck) | 26 | 1921 | British | White Star | 915·5 | 100·1 | 58·2 |
| 52,226 | Berengaria (*ex*-Imperator) | 23 | 1912 | British | Cunard | 883·6 | 98·3 | 57·1 |
| 46,439 | Olympic | 23 | 1911 | British | White Star | 852·5 | 92·5 | 59·5 |
| 45,647 | Aquitania | 23 | 1914 | British | Cunard | 868·7 | 97·0 | 49·7 |
| 34,569 | Paris | 22 | 1921 | French | Cie. Gén. Transatlantique | 735·4 | 85·3 | 59·1 |
| 34,351 | Homeric (*ex*-Columbus) | 18½ | 1922 | British | White Star | 751·0 | 83·3 | 48·6 |
| 32,354 | Columbus | 20 | 1922 | German | Norddeutscher Lloyd | 749·6 | 83·1 | 49·4 |
| 30,696 | Mauretania | 26 | 1907 | British | Cunard | 762·2 | 88·0 | 57·1 |
| 27,132 | Belgenland | 17½ | 1917 | British | International Nav. Co., Ltd. | 670·4 | 78·4 | 44·7 |
| 25,128 | Empress of Scotland (*ex*-Kaiserin Auguste Victoria) | 17½ | 1905 | British | Canadian Pacific Steamships, Ltd. | 677·5 | 77·3 | 50·2 |
| 24,541 | Adriatic | 18 | 1906 | British | White Star | 709·2 | 75·5 | 52·6 |
| 24,149 | Rotterdam | 17 | 1908 | Dutch | Nederl. Amerik Stoomv. Maats | 650·5 | 77·4 | 43·5 |
| 23,884 | Baltic | 17 | 1904 | British | White Star | 709·2 | 75·6 | 52·6 |
| 23,788 | George Washington | 18 | 1908 | United States | U.S. Shipping Board | 699·1 | 78·2 | 50·1 |
| 23,666 | France | 24 | 1912 | French | Cie. Gén. Transatlantique | 689·2 | 75·6 | 48·5 |
| 23,228 | Duilio | 18½ | 1923 | Italian | Nav. Gen. Italiana | 602·4 | 76·3 | 46·3 |
| 21,998 | Minnetonka | 16½ | 1924 | British | Atlantic Transport Co., Ltd. | 600·8 | 80·4 | 49·4 |
| 21,861 | Empress of Australia (*ex*-Tirpitz) | 17 | 1914 | British | Canadian Pacific Steamships, Ltd. | 589·9 | 75·2 | 41·5 |
| 21,716 | Minnewaska | 16½ | 1923 | British | Atlantic Transport Co., Ltd. | 600·8 | 80·4 | 49·4 |
| 21,657 | Giulio Cesare | 20 | 1921 | Italian | Nav. Gen. Italiana | 602·4 | 76·5 | 46·3 |
| 21,517 | Empress of Canada | 20 | 1922 | British | Canadian Pacific Steamships, Ltd. | 627·0 | 77·9 | 42·2 |
| 21,144 | America | 17 | 1905 | United States | U.S. Shipping Board | 668·8 | 74·3 | 47·8 |
| 21,073 | Cedric | 17 | 1903 | British | White Star | 680·9 | 75·3 | 44·1 |
| 21,026 | Celtic | 17 | 1901 | British | ,, ,, | 680·9 | 75·3 | 44·1 |
| 20,847 | Mooltan | 17 | 1923 | British | P. & O. Steam Navigation Co., Ltd. | 600·8 | 73·4 | 48·6 |
| 20,837 | Maloja | 17 | 1923 | British | ,, ,, ,, | 600·8 | 73·4 | 48·6 |
| 20,815 | Albert Ballin | 16 | 1923 | German | Hamburg-Amerika Linie | 602·4 | 78·7 | 41·9 |
| 20,602 | Deutschland | 16 | 1923 | German | ,, ,, | 602·5 | 78·7 | 51·6 |
| 20,576 | Cap Polonio | 18 | 1914 | German | Hamburg Sudamerikanische Damps. Ges. | 637·7 | 72·3 | 39·5 |
| 20,158 | Franconia | 17 | 1923 | British | Cunard | 601·3 | 73·7 | 40·6 |
| 20,000 | Orama | 19 | 1923 | British | Orient Steam Navigation Co., Ltd. | 632·0 | 75·3 | 33·0 |
| 20,000 | Oronsay | 19 | 1924 | British | ,, ,, ,, | 630·0 | 75·0 | 47·0 |

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* The registered dimensions are measured as follows: Length from fore part of stem under bowsprit to aft side of head of stern post; breadth is taken to outside of plating; depth from top of beam of tonnage deck to ceiling at midships. If there is no ceiling it is measured to the tank top. If there are more than two decks, the tonnage deck is the second deck, counting from below.

## GENERAL PARTICULARS OF LARGE SHIPS OF VARIOUS NATIONALITIES.

| Name of Ship . . . . . | AQUITANIA. | MAURETANIA. | OLYMPIC. | LEVIATHAN (formerly Vaterland). | BERENGARIA (formerly Imperator). | MAJESTIC (formerly Bismarck). |
|---|---|---|---|---|---|---|
| Name of Builders . . . . | John Brown & Co., Ltd., Clydebank | Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne | Harland & Wolff, Ltd., Belfast | Blohm & Voss, Hamburg | Vulcan Co., Hamburg | Blohm & Voss, Hamburg. |
| Name of Owners or Managers. | Cunard Co. | Cunard Co. | White Star Line | U.S. Shipping Board | Cunard Co. | White Star Line |
| Year when built . . . . . | 1914 | 1907 | 1911 | 1914 | 1912 | 1921 |
| Length over all . . . . . | 901 ft. 6 ins. | 790 ft. | 883 ft. | 950 ft. | 905 ft. | 956 ft. |
| Length between perpendiculars (or moulded) . . . . . | 865 ft. | 760 ft. | 850 ft. | — | 880 ft. | 912 ft. |
| Breadth . . . . . . . | 96 ft. 6 ins. | 88 ft. | 92 ft. | 100 ft. | 98 ft. | 100 ft. |
| Depth (moulded) . . . . | 64 ft. 6 ins. | 60 ft. 6 ins. | 64 ft. 3 ins. | 63 ft. | 62 ft. | 64 ft. |
| Gross Tonnage . . . . . | 45,647 | 30,696 | 46,439 | 59,957 | 52,226 | 56,551 |
| Draught . . . . . . . | 35 ft. 3¾ ins. | 36 ft. 2½ ins. | 34 ft. 7 ins. | 38 ft. 6 ins. | 35 ft. 6 ins. | 38 ft. 11¼ ins. |
| Displacement (tons) . . . | 51,700 | 41,590 | — | 63,100 | 57,000 | 64,000 |
| Number of Passengers— | | | | | | |
| First Class . . . . . . | 597 | 602 | 817 | 672 † | 700 | 1000 |
| Second Class . . . . | 614 | 430 | 510 | 535 | 600 | 545 |
| Third Class . . . . . | 2000 (and 52 servants) | 780 | 1216 | 2392 ‡ | 2690 | 2392 |
| Machinery Makers . . . . | John Brown & Co., Ltd. | Wallsend Slipway and Engineering Co., Ltd. | Harland & Wolff, Ltd., Belfast | Blohm & Voss, Hamburg | Vulcan Co., Hamburg | Blohm & Voss, Hamburg |
| Type of Engines . . . . | Steam Turbines driving Four Screws | Steam Turbines driving Four Screws | Reciprocating with Turbine on Centre Shaft | Turbines | Steam Turbines driving Four Screws | Steam Turbines driving Four Screws |
| Number of Cranks . . . . | — | — | 8 | — | — | — |
| Diameters of Cylinders . . | — | — | Two 54 ins.; two 84 ins.; and four 97 ins. | — | — | — |
| Stroke of Pistons . . . . | — | — | 75 ins. | — | — | — |
| Revolutions per Minute . | 180 | 200 | Reciprocating engines, 77; Turbine, 165 | 180–190 | 185 | 180 |
| Total Indicated or Shaft Horse-power . . . . . . . . | 60,000 | 75,000 | 51,000 | — | 76,250 | 66,000 |
| Number and Type of Boilers . | 21 Cylindrical (double ended) | 25 Cylindrical (23 double-ended, 2 single-ended) | 29 Cylindrical (24 double-ended, 5 single-ended) | 46 Water Tube | 46 Water Tube | 48 Water Tube |
| Number of Furnaces . . . | 168 (now fitted for oil burning) | 192 (now fitted for oil burning) | 159 (now fitted for oil burning) | 138 | 46 (oil-fired) | 48 (oil-fired) |
| Steam Pressure (lb. per sq. in.) | 195 | 195 | 215 | 235 | 235 | 260 |
| Total Heating Surface (sq. ft.) | 138,595 | 159,000 | 142,454 | 210,440 | 203,009 | 220,000 |
| Total Grate Area (sq. ft.) . . | 3541 | 4060 | 3428 | 3843 | 3763 | 4013 |
| System of Draught . . . . | Howden's | Howden's | Natural | Howden's | Howden's | Forced |
| Speed on Service (knots) . . | 24 | 25·5 * | 23 | 21 | 23 | 23·5 |

* NOTE.—This figure is the mean speed attained for 27 consecutive runs across the North Atlantic in one year covering a total distance of 77,500 nautical miles. The highest mean speed from New York to Cherbourg was 26·25 knots; see page 536.

† 80 Berths for Servants and 110 Pullman Berths in addition.

‡ Including 1542 Fourth Class Passengers.

## FASTEST STEAMERS OF THE WORLD.†

| Speed (knots). | Name. | Gross Tonnage. | Date built. | Flag. | Owners. | L.* (ft.). | B.* (ft.). | D.* (ft.). |
|---|---|---|---|---|---|---|---|---|
| 26 and under 27 | Majestic | 56,551 | 1921 | British | White Star | 915·5 | 100·1 | 58·2 |
| | Mauretania | 30,696 | 1907 | ,, | Cunard | 762·2 | 88·0 | 57·1 |
| 25 and under 26 | Paris | 1,774 | 1913 | ,, | Southern Rly. | 293·5 | 35 6 | 15 2 |
| | Versailles | 1,903 | 1919 | French | Chemins de Fer de l'État Français and the Southern Rly. | 300·6 | 34·6 | 21 4 |
| 24 and under 25. | Anglia | 3,460 | 1920 | British | London, Midland & Scottish Rly. | 380·5 | 45·2 | 10·5 |
| | Cambria | 3,445 | 1921 | ,, | ,, | 380 6 | 45·2 | 17 2 |
| | Hibernia | 3,458 | 1920 | ,, | ,, | 380·6 | 45·2 | 17·2 |
| | Scotia | 3,441 | 1921 | ,, | ,, | 380·5 | 45·2 | 26·2 |
| | Newhaven | 1,656 | 1911 | French | Chemins de Fer de l'État Français and the Southern Rly. | 292·0 | 34·6 | 22 1 |
| | Rouen | 1,656 | 1912 | ,, | | 292·0 | 34·6 | 22·1 |
| | France | 23,666 | 1912 | ,, | Cie. Gén. Transatlantique | 689·2 | 75 6 | 48·5 |
| 23 and under 24. | Aquitania | 45,647 | 1914 | British | Cunard | 868·7 | 97·0 | 49 7 |
| | Maid of Orleans | 2,071 | 1918 | ,, | Southern Railway. | 341·1 | 42·1 | 16 0 |
| | Munster | 2,646 | 1897 | ,, | City of Dublin Steam Packet Co. | 360·0 | 41 5 | 27·3 |
| | Olympic | 46,439 | 1911 | ,, | White Star | 852·5 | 92·5 | 59·5 |
| | Ulster | 2,641 | 1896 | ,, | City of Dublin Steam Packet Co. | 360·0 | 41 5 | 27·5 |
| | Viking | 1,957 | 1905 | ,, | Isle of Man St. Packet Co. | 350·4 | 42·0 | 16·1 |
| | Berengaria | 52,226 | 1912 | ,, | Cunard | 883·6 | 98·3 | 57·1 |
| | Biarritz | 2,053 | 1915 | ,, | Southern Rly. | 341·2 | 42·1 | 24 0 |
| | Leviathan | 59,957 | 1914 | U.S. | U.S. Shipping Board | 907·6 | 63·1 | 58·2 |
| | H. F. Alexander | 8,357 | 1915 | ,, | Admiral Line | 509·5 | 100·3 | 21·0 |
| 22 and under 23. | Brighton | 1,129 | 1903 | British | Southern Rly. | 273·6 | 34·2 | 14·1 |
| | Dieppe | 1,228 | 1905 | ,, | ,, | 273·5 | 34·8 | 13·8 |
| | Engadine | 1,676 | 1911 | ,, | ,, | 316·0 | 41·1 | 15 8 |
| | Manxman | 2,030 | 1904 | ,, | Isle of Man St. Packet Co. | 334·0 | 43·1 | 17·3 |
| | Mona's Isle | 1,688 | 1905 | ,, | ,, | 311·2 | 40·1 | 15·7 |
| | Riviera | 1,675 | 1911 | ,, | Southern Rly. | 316·0 | 41·1 | 15 8 |
| | Snaefell | 1,713 | 1906 | ,, | Isle of Man St. Packet Co. | 315·0 | 39·6 | 15·7 |
| | St. Andrew | 2,495 | 1908 | ,, | Fishguard and Rosslare Railways and Harbours Co. | 351·1 | 41·1 | 16·5 |
| | St. David | 2,457 | 1906 | ,, | ,, | 350·8 | 41·1 | 16·5 |
| | St. Patrick | 2,456 | 1906 | ,, | ,, | 350·8 | 41·1 | 16·5 |
| | Victoria | 1,689 | 1907 | ,, | Southern Rly. | 311·0 | 40·1 | 15·8 |
| | Wahine | 4,436 | 1913 | ,, | Union S.S. Co. of New Zealand, Ltd. | 375·0 | 52·2 | 25·6 |
| | Paris | 34,569 | 1921 | French | Cie. Gén. Transatlantique | 735·4 | 85·3 | 59·1 |
| | Mecklenburg | 2,907 | 1922 | Dutch | Stoomv. Maats. "Zeeland" | 350·4 | 42·7 | 23·9 |
| | Prinses Juliana | 2,908 | 1920 | ,, | ,, | 350·4 | 42·7 | 23 9 |
| | Oranje Nassau | 2,885 | 1909 | ,, | ,, | 350·0 | 43·1 | 16·4 |
| 21 and under 22 | Antwerp | 2,957 | 1920 | British | London and North Eastern Rly. | 321·6 | 43·1 | 17·9 |
| | Arundel | 1,068 | 1900 | ,, | Southern Rly. | 269·1 | 34·1 | 14·1 |
| | Bruges | 2,949 | 1920 | ,, | London and North Eastern Rly. | 321·6 | 43·1 | 17 9 |
| | King Orry | 1,877 | 1913 | ,, | Isle of Man St. Packet Co. | 300·0 | 43 1 | 15·9 |
| | Malines | 2,969 | 1921 | ,, | London and North Eastern Rly. | 320·7 | 43·2 | 25·7 |
| | Princess Patricia | 1,158 | 1902 | ,, | Canadian Pacific Rly. Co. | 270·0 | 32·1 | 11·6 |
| | La Savoie | 11,168 | 1900 | French | Cie. Gén. Transatlantique | 563·1 | 60·0 | 35 9 |
| | Esperia | 11,346 | 1918 | Italian | Soc. Italiana di Servizi Marittimi | 492·1 | 61·7 | 34·1 |
| 20 and under 21. | Venezia | 988 | 1906 | ,, | D. Tripcovich | 275·0 | 32·1 | 10·2 |
| | Britannia | 459 | 1896 | British | P. and A. Campbell, Ltd | 230·0 | 26·6 | 9·6 |
| | Cambria | 420 | 1895 | ,, | ,, | 225·0 | 26·1 | 9·4 |
| | Curraghmore | 1,587 | 1919 | ,, | London, Midland and Scottish Rly. | 307·1 | 40·1 | 14·5 |
| | Devonia | 520 | 1905 | ,, | P. and A. Campbell, Ltd. | 245 0 | 29·0 | 9·7 |
| | Empress of Asia | 16,909 | 1913 | ,, | Canadian Pacific Steamships, Ltd. | 570·1 | 68·2 | 42·0 |

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* Registered dimensions; see note on p. 532.

† The speeds used in compiling this table are as given by the owners.

## FASTEST STEAMERS OF THE WORLD†—*continued.*

| Speed (knots.) | Name. | Gross Tonnage. | Date built. | Flag. | Owners. | L.* (ft.). | B.* (ft.). | D.* (ft.). |
|---|---|---|---|---|---|---|---|---|
| 20 and under 21. | Empress of Canada | 21,517 | 1922 | British | Canadian Pacific Steamships, Ltd. | 627·0 | 77·9 | 42·2 |
| | Empress of Russia | 16,810 | 1913 | ,, | ,, | 570·2 | 68·2 | 42·0 |
| | Lady Moyra | 519 | 1905 | ,, | P. and A. Campbell, Ltd. | 245·0 | 29·0 | 9·7 |
| | Loongana | 2,448 | 1904 | ,, | Tasmanian Steamers Pty., Ltd. | 300·3 | 43·1 | 23·3 |
| | Maori | 3,488 | 1907 | ,, | ,, | 350·5 | 47·2 | 24·7 |
| | Manx Maid | 1,504 | 1910 | ,, | Isle of Man St. Packet Co. | 284·6 | 39·1 | 15·8 |
| | Nairana | 3,042 | 1917 | ,, | Tasmanian Steamers Pty., Ltd. | 315·8 | 45·6 | 23·6 |
| | Queen Alexandra | 785 | 1912 | ,, | J. Williamson & Co. | 270·3 | 32·1 | 11·0 |
| | St. George | 2,571 | 1906 | ,, | London & North Eastern Rly. | 352·0 | 41·1 | 16·2 |
| | Westward Ho | 438 | 1894 | ,, | P. and A. Campbell, Ltd. | 225·0 | 26·1 | 9·5 |
| | Jan Breydel | 1,767 | 1909 | Belgian | Belgian Government | 348·0 | 40·0 | 23·2 |
| | Pieter de Coninck | 1,767 | 1910 | ,, | ,, | 348·0 | 40·0 | 23·2 |
| | Princesse Elisabeth | 1,747 | 1905 | ,, | ,, | 357·0 | 40·0 | 23·2 |
| | Princess Marie José | 1,821 | 1922 | ,, | ,, | 348·0 | 40·0 | 23·3 |
| | Stad Antwerpen | 1,384 | 1913 | ,, | ,, | 300·0 | 36·0 | 22·9 |
| | Ville de Liège | 1,384 | 1913 | ,, | ,, | 300·0 | 36·0 | 22·9 |
| | Charles Roux | 4,104 | 1908 | French | Cie. Gén. Transatlantique | 385·5 | 45·6 | 26·1 |
| | Lutetia | 14,654 | 1913 | ,, | Cie. de Nav. Sud Atlantique | 579·0 | 64·1 | 36·7 |
| | Massilia | 15,147 | 1920 | ,, | ,, | 574·0 | 64·0 | 40·2 |
| | Columbus | 32,354 | 1922 | German | Norddeutscher Lloyd | 749·6 | 46·0 | 23·6 |
| | Giulio Cesare | 21,657 | 1921 | Italian | Nav. Gen. Italiana | 602·4 | 76·5 | 46·3 |
| | Conte Rosso | 17,048 | 1922 | ,, | Lloyd Sabaudo | 570·2 | 74·2 | 35·9 |
| | Conte Verde | 18,765 | 1923 | ,, | ,, ,, | 570·2 | 74·2 | 35·9 |
| | Città di Catania | 3,397 | 1910 | ,, | Italian State Rlys. | 363·5 | 42·1 | 18·8 |
| | Città di Siracusa | 3,497 | 1910 | ,, | ,, | 363·5 | 42·1 | 18·5 |
| | Nagasaki Maru | 5,272 | 1922 | Japanese | Nippon Yusen Kabushiki Kaisha | 395·0 | 54·2 | 29·0 |
| | Shanghai Maru | 5,252 | 1923 | ,, | ,, | 395·0 | 54·2 | 29·0 |
| | Agamemnon | 19,361 | 1902 | U.S. | U.S. Shipping Board | 684·3 | 72·3 | 40·2 |
| | City of Detroit III. | 6,061 | 1912 | ,, | Detroit and Cleveland Navigation Co. | 455·8 | 55·5 | 22·5 |
| | Mount Vernon | 18,372 | 1906 | ,, | U.S. Shipping Board | 685·4 | 72·2 | 40·5 |
| | Midland | 1,535 | 1895 | ,, | Norfolk and Washington Steamboat Co. | 260·0 | 46·0 | 14·1 |
| | Northland | 2,055 | 1911 | ,, | ,, | 291·2 | 51·0 | 18·0 |
| | Southland | 2,081 | 1908 | ,, | ,, | 291·2 | 51·0 | 16·1 |
| | Tacoma | 836 | 1913 | ,, | J. Green | 209·4 | 30·0 | 17·6 |

* Registered dimensions; see note on p. 532.

## NUMBERS OF MERCHANT VESSELS OF VARIOUS SPEEDS.†

| Speed. | Number. | | | | Speed. | Number. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1910. | 1922. | 1923. | 1924. | | 1910. | 1922. | 1923. | 1924. |
| 25 knots and over | — | 8 | 4 | 4 | 16½ knots | 45 | 44 | 49 | 53 |
| 24 ,, and under 25 | — | 9 | 8 | 7 | 16 ,, | 126 | 131 | 134 | 132 |
| 23 ,, ,, 24 | — | 5 | 8 | 8 | 15½ ,, | 47 | 35 | 44 | 45 |
| 22 ,, ,, 23 | — | 17 | 19 | 16 | 15 ,, | 215 | 185 | 197 | 201 |
| 21 ,, ,, 22 | — | 20 | 7 | 9 | 14½ ,, | 85 | 81 | 85 | 102 |
| 20 ,, ,, 21 | 105* | 32 | 36 | 39 | 14 ,, | 276 | 289 | 306 | 319 |
| 19 ,, ,, 20 | 42 | 26 | 23 | 19 | 13½ ,, | 138 | 170 | 162 | 172 |
| 18½ knots | 24 | 18 | 20 | 16 | 13 ,, | 462 | 458 | 466 | 461 |
| 18 ,, | 60 | 54 | 53 | 55 | 12½ ,, | 206 | 153 | 172 | 195 |
| 17½ ,, | 48 | 36 | 35 | 34 | 12 ,, | 732 | 790 | 848 | 853 |
| 17 ,, | 83 | 88 | 124 | 120 | | | | | |

* This figure includes all merchant steamers of 20 knots and over in existence in 1910.

† The speeds used in compiling these tables are as given by the owners.

## PARTICULARS OF FASTEST VOYAGES ON PRINCIPAL PASSENGER SERVICES.

| Name of vessel. | Owners. | Date of Voyage. | Ports between which Voyage was made. | Total distance (Sea miles). | Time taken. | Average speed (Knots). | Best day's run (Knots). | Remarks |
|---|---|---|---|---|---|---|---|---|
| Mauretania . . | Cunard Steam Ship Co., Ltd. | Sept., 1910 | Liverpool and New York | 2,780* | 4 days, 10 hours, 41 mins. | 26·06 | — | * The distance given is between Daunts Rock and Sandy Hook Lightship, the points between which the time was taken. On a voyage in January, 1911, the Mauretania attained a speed of 27·04 knots for one day, and the best day's run on the same voyage was 676 knots.<br>§ The distance given is between Ambrose Channel Light Vessel and Cherbourg Breakwater.<br>† Record sea transit to Bombay, but not record speed as vessel did not have to deviate to Marseilles.<br>‡ Now owned by the London and North Eastern Railway. |
| ,, | ,, ,, | Aug., 1924 | New York and Cherbourg | 3,198§ | 5 days 1 hour, 49 mins. | 26·25 | — | |
| Majestic . . . | White Star Line | Sept., 1923 | New York and Southampton *via* Cherbourg | 3,104 (ocean passage) | 5 days, 5 hours, 21 mins. | 24·76 | 613 | |
| Empress of France | Canadian Pacific Steamships, Ltd. | July 17–24, 1924 | Southampton and Quebec | 2,640 | 5 days, 8 hours, 51 mins. | 20·49 | — | |
| China . . . . | Peninsular and Oriental Steam Navigation Co. | Sept. 26 to Oct. 14, 1919 | London and Bombay | 6,258 | 17 days, 20 hours.† | 15·7 | — | |
| Orcoma . . . | Pacific Steam Navigation Co. | Feb. 22 to May 7, 1923 | Liverpool, Valparaiso, Liverpool, *via* Panama Canal | 18,627 | 73 days, 8 hours (actual steaming 55 d. 8¼ h.) | 14·0 | 371 | |
| Paris . . . . | Southern Railway and French State Railway | July 14, 1913 | Newhaven and Dieppe | 65 | 2 hours, 35 mins., 37 secs. | 25·07 | — | |
| Maid of Orleans . | Southern Railway | April 25 & 28, 1922 | Dover and Calais | 20 | 50 mins. | 24·0 | — | |
| St. George . . | Gt. Western Railway ‡ | July 6, 1910 | Fishguard and Rosslare | 54 | 2 hours, 28 mins. | 21·9 | — | |
| Lorina . . . . | Southern Railway | Sept. 4, 1920 | Jersey and Southampton | 130 | 6 hours, 34 mins. | 19·8 | — | |

## NUMBERS OF VESSELS CLASSED BY VARIOUS CLASSIFICATION SOCIETIES.*

| Society. | | 1910. | 1913. | 1919. | 1921. | 1922. | 1923. | 1924. |
|---|---|---|---|---|---|---|---|---|
| Lloyd's Register | | 10,302 | 10,466 | 9175 | 10,154 | 10,361 | 10,296 | 10,053 |
| British Corporation | | 675 | 876 | 1002 | 1190 | 1341 | 1306 | 1234 |
| American Bureau of Shipping | Record of American and Foreign Shipping | 1139 | 846 | 926 | 2216 | 2565 | 2392 | 2226 |
| | Gt. Lakes Register | 609 | 572 | 442 | 392 | 382 | 416 | 382 |
| Bureau Veritas | | 4626 | 5165 | 5706 | 6387 | 6521 | 4998 | 4903 |
| Norske Veritas | | 1560 | 1604 | 955 | 1109 | 1217 | 1242 | 1244 |
| Registro Italiano | | 1263 | 1442 | 699 | 1280 | 1987 | 1872 | 1901 |
| Germanischer Lloyd | | 2672 | 2848 | — | 2219 | — | 2799 | 2894 |
| Veritas Adriatico | | 1041 | 1146 | 516 | 471 | † | † | † |

* Many vessels, of course, are not exclusively classed in one Register.

† The Veritas Adriatico is now amalgamated with the Registro Italiano.

## PAY IN THE MERCHANT SERVICE.—MONTHLY RATES.

*Foreign-going Cargo Steamers.**

| Rating. | 1914. | | | | | 1924.† | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | | £ | s. | £ | s. | | £ | s. |
| First Mates | 12 | 5 | to | 14 | 5 | 17 | 10 | to | 26 | 10 |
| Second Mates | 9 | 5 | ,, | 12 | 15 | 15 | 0 | ,, | 18 | 10 |
| Third Mates | 7 | 10 | ,, | 10 | 10 | 13 | 0 | ,, | 14 | 0 |
| Chief Engineers | 16 | 15 | ,, | 24 | 0 | 21 | 10 | ,, | 34 | 10 |
| Second Engineers | 12 | 5 | ,, | 14 | 15 | 17 | 10 | ,, | 26 | 10 |
| Third Engineers | 8 | 15 | ,, | 11 | 15 | 15 | 0 | ,, | 18 | 10 |
| Carpenters | 7 | 0 | ,, | 7 | 10 | 12 | 10 | ,, | 14 | 10 |
| Boatswains | 6 | 5 | ,, | 6 | 10 | 11 | 10 | (Fixed rate.) | | |
| Firemen | 5 | 10 | ,, | 6 | 0 | 10 | 10 | ,, | | |
| Able Seamen | 5 | 0 | ,, | 5 | 10 | 10 | 0 | ,, | | |

* On Oil-Tank Vessels, the 1924 rates are supplemented by the following percentage additions:—

| | |
|---|---|
| Chief Engineers | 12½ per cent. |
| First Mates and Second Engineers | 10 ,, |
| Other Mates and Engineers | 7½ ,, |

On Motor Vessels there is a special National Standard Scale of Pay for Engineer Officers substantially higher than on steam-driven vessels.

† The 1924 figures are the National Maritime Board standard rates of pay, effective from September 5, 1924, and based, in the case of Navigating and Engineer Officers, on tonnage and seniority.

On Passenger Liners, Navigating and Engineer Officers, as a rule, receive now, as before the War, wages from 10 to 25 per cent. higher than the Standard Cargo-Vessel rates.

## NUMBER AND GROSS TONNAGE OF THE VESSELS OF 100 TONS GROSS AND UPWARDS (STEAM, SAIL, AND MOTOR) BELONGING TO EACH OF THE SEVERAL COUNTRIES OF THE WORLD, AS RECORDED IN LLOYD'S REGISTER.

| Flag. | June, 1913. | | June, 1919. | | June, 1921. | |
|---|---|---|---|---|---|---|
| | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. |
| Gt. Britain and Ireland | 9,214 | 18,696,237 | 7,964 | 16,555,471 | 9,034 | 19,571,554 |
| British Dominions . | 2,073 | 1,735,306 | 2,141 | 2,052,404 | 2,399 | 2,499,244 |
| Total . . | 11,287 | 20,431,543 | 10,105 | 18,607,875 | 11,433 | 22,070,798 |
| American Sea . . | 2,696 | 2,998,457 | 4,350 | 10,782,170 | 4,958 | 14,697,088 |
| Lakes . . | 627 | 2,382,690 | 506 | 2,257,786 | 494 | 2,254,930 |
| Philippine Islands . | 77 | 46,489 | 73 | 51,817 | 99 | 73,984 |
| Total . | 3,400 | 5,427,636 | 4,929 | 13,091,773 | 5,551 | 17,026,002 |
| Argentine . . . . | 308 | 214,835 | 215 | 154,441 | 209 | 167,154 |
| Austro-Hungarian . . | 427 | 1,011,414 | 339 | 714,617 | — | — |
| Belgian . . . . . | 172 | 304,386 | 152 | 313,276 | 256 | 551,031 |
| Brazilian . . . . | 459 | 329,637 | 428 | 512,675 | 402 | 499,325 |
| Chilian . . . . . | 131 | 139,792 | 114 | 101,647 | 124 | 113,447 |
| Chinese . . . . . | 66 | 86,690 | 102 | 132,515 | 122 | 163,037 |
| Cuban . . . . . | 59 | 61,536 | 51 | 47,295 | 59 | 58,553 |
| Danish . . . . . | 811 | 762,054 | 645 | 702,436 | 798 | 964,464 |
| Dutch . . . . . | 759 | 1,309,849 | 931 | 1,591,911 | 1,069 | 2,225,787 |
| Esthonian . . . . | — | — | — | — | 90 | 41,183 |
| Finnish . . . . . | — | — | 338 | 180,962 | 330 | 198,352 |
| French . . . . . | 1,552 | 2,201,164 | 1,440 | 2,233,631 | 2,044 | 3,652,249 |
| German . . . . . | 2,321 | 5,082,061 | 1,768 | 3,503,380 | 1,255 | 717,450 |
| Greek . . . . . | 442 | 722,782 | 312 | 323,796 | 362 | 599,929 |
| Italian . . . . . | 1,114 | 1,521,942 | 858 | 1,370,097 | 1,271 | 2,650,573 |
| Japanese . . . . | 1,037 | 1,500,014 | 1,418 | 2,325,266 | 2,033 | 3,354,806 |
| Latvian . . . . . | — | — | — | — | 99 | 53,342 |
| Norwegian . . . . | 2,191 | 2,457,890 | 1,629 | 1,857,829 | 1,889 | 2,584,058 |
| Peruvian . . . . | 60 | 45,514 | 63 | 79,342 | 68 | 87,167 |
| Portuguese . . . . | 208 | 120,579 | 227 | 261,212 | 284 | 296,847 |
| Roumanian . . . | 33 | 45,408 | 35 | 63,792 | 37 | 73,973 |
| Russian . . . . . | 1,216 | 974,178 | 618 | 541,005 | 465 | 412,459 |
| Spanish . . . . . | 607 | 840,995 | 576 | 750,611 | 828 | 1,165,541 |
| Swedish . . . . . | 1,436 | 1,047,270 | 1,263 | 992,611 | 1,353 | 1,160,211 |
| Turkish . . . . . | 272 | 157,298 | 161 | 116,249 | — | — |
| Uruguayan . . . . | 65 | 75,531 | 43 | 44,499 | 54 | 85,886 |
| Other Countries and flag not recorded . | 158 | 98,115 | 495 | 304,530 | 721 | 1,001,029 |
| Total . . . . . | 30,591 | 46,970,113 | 29,255 | 0,919,2735 | 33,206 | 61,974,653 |

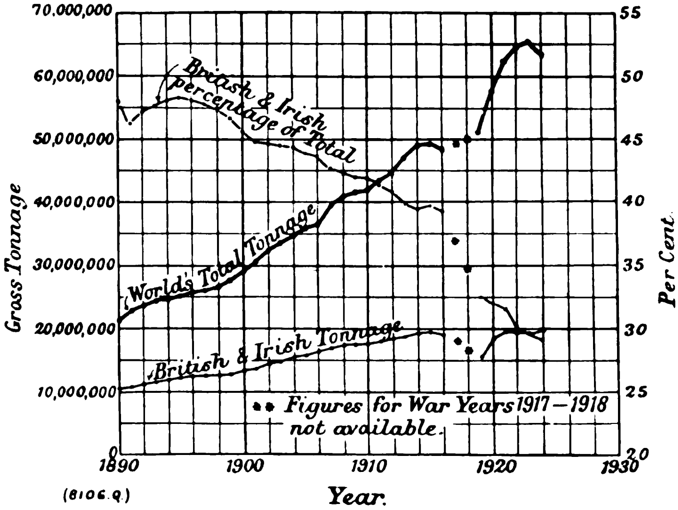
## NUMBER AND GROSS TONNAGE OF THE VESSELS OF 100 TONS GROSS AND UPWARDS (STEAM, SAIL, AND MOTOR) BELONGING TO EACH OF THE SEVERAL COUNTRIES OF THE WORLD, AS RECORDED IN LLOYD'S REGISTER—*continued.*

| Flag. | | June, 1922. | | June, 1923. | | June, 1924. | |
|---|---|---|---|---|---|---|---|
| | | No. | Gross Tonnage. | No. | Gross Tonnage. | No. | Gross Tonnage. |
| Gt. Britain and Ireland | | 8,849 | 19,295,637 | 8,694 | 19,281,549 | 8,559 | 19.105,888 |
| British Dominions | | 2,472 | 2,746,883 | 2,441 | 2,776,563 | 2,449 | 2,772,662 |
| Total | | 11,321 | 22,042,520 | 11,135 | 22,058,112 | 11,008 | 21,878,500 |
| American | Sea | 4,886 | 14,738,506 | 4,812 | 14,597,035 | 4,508 | 13,530,544 |
| | Lakes | 495 | 2,247,690 | 513 | 2,286,619 | 524 | 2,361,464 |
| | Philippine Islands | 99 | 76,264 | 91 | 61,709 | 96 | 64,959 |
| | Total | 5,480 | 17,062,460 | 5,416 | 16,945,363 | 5,128 | 15,956,967 |
| Argentine | | 216 | 181,555 | 199 | 178,465 | 215 | 199,185 |
| Austro-Hungarian | | — | — | — | — | — | — |
| Belgian | | 275 | 579,477 | 270 | 616,670 | 251 | 560,597 |
| Brazilian | | 399 | 492,571 | 362 | 478,630 | 375 | 464,734 |
| Chilian | | 126 | 131,401 | 137 | 171,958 | 147 | 181,092 |
| Chinese | | 134 | 188,388 | 157 | 222,970 | 168 | 248,108 |
| Cuban | | 65 | 62,677 | 64 | 50,425 | 70 | 59,523 |
| Danish | | 822 | 1,038,138 | 780 | 996,862 | 764 | 1,035,948 |
| Dutch | | 1,164 | 2,632,713 | 1,114 | 2,625,741 | 1,082 | 2,556,417 |
| Esthonian | | 98 | 45,259 | 112 | 49,403 | 108 | 45,897 |
| Finnish | | 352 | 213,671 | 319 | 200,254 | 322 | 207,952 |
| French | | 2,094 | 3,845,792 | 2,021 | 3,737,244 | 1,857 | 3,498,233 |
| German | | 1,723 | 1,887,408 | 1,843 | 2,590,073 | 2,003 | 2,953,671 |
| Greek | | 379 | 668,127 | 405 | 755,441 | 409 | 761,210 |
| Italian | | 1,413 | 2,866,335 | 1,415 | 3,033,742 | 1,299 | 2,832,212 |
| Japanese | | 2,026 | 3,586,918 | 2,003 | 3,604,147 | 2,055 | 3,842,707 |
| Latvian | | 67 | 40,124 | 55 | 39,006 | 69 | 46,281 |
| Norwegian | | 1,852 | 2,600,861 | 1,800 | 2,551,912 | 1,753 | 2,505,393 |
| Peruvian | | 74 | 101,209 | 47 | 82,193 | 38 | 70,821 |
| Portuguese | | 286 | 285,878 | 284 | 301,607 | 279 | 301,308 |
| Roumanian | | 31 | 72,297 | 32 | 73,848 | 39 | 71,183 |
| Russian | | — | — | — | — | 397 | 338,792 |
| Spanish | | 973 | 1,282,757 | 949 | 1,260,206 | 950 | 1,239,521 |
| Swedish | | 1,345 | 1,115,375 | 1,385 | 1,207,727 | 1,405 | 1,254,550 |
| Turkish | | — | — | — | — | 134 | 105,148 |
| Uruguayan | | 53 | 76,311 | 67 | 85,511 | 68 | 79,920 |
| Other Countries and flag not recorded | | 1,167 | 1,270,564 | 1,116 | 1,248,728 | 563 | 727,702 |
| Total | | 33,935 | 64,370,786 | 33,507 | 65,166,238 | 32,956 | 64,023,567 |

### WORLD'S TOTAL MERCHANT TONNAGE, BRITISH AND IRISH TONNAGE, AND PERCENTAGE OF BRITISH AND IRISH TONNAGE OF THE WORLD'S TOTAL.

| Year. | World. |  | Great Britain and Ireland. |  | Percentage of British and Irish Tonnage of Total. |
|---|---|---|---|---|---|
|  | Number. | Tonnage. | Number. | Tonnage. |  |
| 1890 | 32,174 | 21,118,528 | 9,167 | 10,241,856 | 48·4 |
| 1891 | 32,227 | 22,912,753 | 9,098 | 10,585,747 | 46·3 |
| 1892 | 31,983 | 23,672,698 | 9,260 | 11,157,662 | 47·1 |
| 1893 | 31,926 | 24,236,865 | 9,333 | 11,563,997 | 47·6 |
| 1894 | 30,640 | 24,547,597 | 9,261 | 11,807,010 | 48·1 |
| 1895 | 30,288 | 25,086,199 | 9,227 | 12,117,957 | 48·3 |
| 1896 | 29,801 | 25,593,186 | 9,140 | 12,293,539 | 48·1 |
| 1897 | 28,280 | 25,889,044 | 9,107 | 12,403,409 | 47·9 |
| 1898 | 27,982 | 26,543,360 | 9,044 | 12,587,904 | 47·4 |
| 1899 | 27,816 | 27,613,851 | 8,973 | 12,926,924 | 46·8 |
| 1900 | 27,840 | 28,957,358 | 8,914 | 13,241,446 | 45·8 |
| 1901 | 28,209 | 30,479,971 | 8,934 | 13,656,161 | 44·8 |
| 1902 | 28,630 | 32,302,412 | 9,043 | 14,431,072 | 44·7 |
| 1903 | 28,901 | 33,501,855 | 9,152 | 14,889,571 | 44·5 |
| 1904 | 29,283 | 34,786,132 | 9,236 | 15,391,350 | 44·3 |
| 1905 | 29,750 | 35,998,180 | 9,348 | 15,803,180 | 43·9 |
| 1906 | 30,087 | 37,550,477 | 9,408 | 16,381,850 | 43·6 |
| 1907 | 30,197 | 39,435,788 | 9,517 | 16,999,668 | 43·1 |
| 1908 | 30,524 | 40,920,551 | 9,542 | 17,318,351 | 42·3 |
| 1909 | 36,536 | 41,447,825 | 9,491 | 17,377,936 | 42·0 |
| 1910 | 30.053 | 41,912,520 | 9,417 | 17,516,479 | 41·9 |
| 1911 | 30,082 | 43,144,909 | 9,334 | 17,872,697 | 41·4 |
| 1912 | 30,316 | 44,600,677 | 9,279 | 18,213,620 | 40·8 |
| 1913 | 30,591 | 46,970,113 | 9,214 | 18,696,237 | 39·8 |
| 1914 | 30,836 | 49,089,552 | 9,240 | 19,256,766 | 39·4 |
| 1915 | 30,720 | 49,261,769 | 9,285 | 19,541,368 | 39·7 |
| 1916 | 30,167 | 48,683,136 | 9,069 | 19,134,857 | 39·3 |
| 1917* | — | — | — | — | — |
| 1918* | — | — | — | — | — |
| 1919 | 29,255 | 50,919,273 | 7,964 | 16,555,471 | 32·5 |
| 1920 | 31,595 | 57,314,065 | 8,561 | 18,330,424 | 32·0 |
| 1921 | 33,206 | 61,974,653 | 9,034 | 19,571,554 | 31·6 |
| 1922 | 33,935 | 64,370,786 | 8,849 | 19,295,637 | 30·0 |
| 1923 | 33,507 | 65,166,238 | 8,694 | 19,281,549 | 29·6 |
| 1924 | 32,956 | 64,023,567 | 8,559 | 19,105,838 | 29·9 |

* Figures for 1917 and 1918 not available.



(8106.Q.)

## TABLE SHOWING THE NUMBERS AND GROSS TONNAGES OF STEAMERS AND MOTOR VESSELS OWNED BY THE PRINCIPAL MARITIME COUNTRIES ON JUNE 30, 1924.

| Country. | Numbers of Vessels Owned of Various Gross Tonnages. | | | | | | | | | | Total Number of Vessels owned. | Percentage of Total Number of Ships of 6000 gross tons and over. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100 tons and under 500 tons. | 500 tons and under 1000 tons. | 1000 tons and under 2000 tons. | 2000 tons and under 4000 tons. | 4000 tons and under 6000 tons. | 6000 tons and under 8000 tons. | 8000 tons and under 10,000 tons. | 10,000 tons and under 15,000 tons. | 15,000 tons and under 20,000 tons. | 20,000 tons and over. | | |
| Gt. Brit. & Ireland | 3,664 | 738 | 814 | 935 | 1,145 | 506 | 180 | 132 | 34 | 21 | 8,169 | 10·7 |
| British Dominions | 942 | 253 | 285 | 264 | 106 | 38 | 10 | 8 | 3 | — | 1,909 | 3·1 |
| United States . . | 653 | 202 | 256 | 1,161 | 920 | 651 | 102 | 38 | 6 | 3 | 3,992 | 20·0 |
| Denmark . . . | 173 | 92 | 207 | 98 | 32 | 12 | 5 | 3 | — | — | 622 | 3·2 |
| France . . . . | 665 | 109 | 185 | 275 | 173 | 69 | 37 | 23 | 2 | 2 | 1,540 | 8·6 |
| Germany . . . | 877 | 356 | 258 | 196 | 117 | 58 | 28 | 11 | 1 | 4 | 1,906 | 5·3 |
| Holland . . . | 375 | 66 | 168 | 170 | 105 | 100 | 31 | 8 | 3 | 1 | 1,027 | 13·9 |
| Italy . . . . | 275 | 90 | 103 | 196 | 200 | 78 | 20 | 5 | 2 | 2 | 971 | 11·0 |
| Japan . . . . | 813 | 292 | 265 | 339 | 228 | 88 | 18 | 12 | — | — | 2,055 | 5·7 |
| Norway . . | 663 | 212 | 413 | 213 | 123 | 37 | 1 | 2 | — | — | 1,664 | 2·4 |
| Spain . . . . | 351 | 94 | 108 | 189 | 45 | 7 | 2 | 4 | — | — | 800 | 1·6 |
| Sweden . . . | 633 | 151 | 265 | 91 | 48 | 6 | — | 3 | — | — | 1,197 | 0·7 |
| Other Countries . | 1,473 | 465 | 496 | 481 | 199 | 39 | 14 | 2 | 3 | — | 3,172 | 1·8 |
| Total for the whole World . . . | 11,557 | 3,120 | 3,823 | 4,608 | 3,441 | 1,689 | 448 | 251 | 54 | 33 | 29,024 | 8·5 |

## TABLE SHOWING THE NUMBERS AND AGES OF STEAMERS AND MOTOR VESSELS OWNED BY THE PRINCIPAL MARITIME COUNTRIES ON JUNE 30, 1924.

| Country. | Numbers of Vessels owned of Various Ages. | | | | | | Total Number of Vessels owned. | Percentage of Total Number of Ships under 5 years old. |
|---|---|---|---|---|---|---|---|---|
| | Under 5 years. | 5 years and under 10 years | 10 years and under 15 years. | 15 years and under 20 years. | 20 years and under 25 years. | 25 years and over. | | |
| Gt. Brit. & Ireland | 1,346 | 1,777 | 1,432 | 1,102 | 903 | 1,609 | 8,169 | 16·5 |
| British Dominions | 239 | 283 | 325 | 297 | 236 | 529 | 1,909 | 12·5 |
| United States . . | 787 | 1,688 | 320 | 365 | 352 | 480 | 3,992 | 19·7 |
| Denmark . . . | 177 | 116 | 53 | 74 | 71 | 131 | 622 | 28·5 |
| France . . . . | 315 | 301 | 251 | 214 | 133 | 326 | 1,540 | 20·4 |
| Germany . . . | 655 | 224 | 222 | 234 | 178 | 393 | 1,906 | 34·4 |
| Holland . . . | 252 | 278 | 158 | 119 | 110 | 110 | 1,027 | 24·6 |
| Italy . . . . | 166 | 137 | 130 | 118 | 115 | 305 | 971 | 17·1 |
| Japan . . . . | 347 | 797 | 173 | 177 | 173 | 388 | 2,055 | 16·9 |
| Norway . . . | 311 | 392 | 248 | 208 | 158 | 347 | 1,664 | 18·7 |
| Spain . . . . | 111 | 160 | 45 | 50 | 52 | 382 | 800 | 13·9 |
| Sweden . . . | 122 | 195 | 101 | 128 | 111 | 540 | 1,197 | 10·2 |
| Other Countries . | 231 | 383 | 398 | 462 | 390 | 1,308 | 3,172 | 7·3 |
| Total for the whole World . . . | 5,059 | 6,731 | 3,856 | 3,547 | 2,983 | 6,848 | 29,024 | 17·4 |

## FLUCTUATIONS IN THE PRICE OF A NEW, READY, 7,500-TON CARGO STEAMER.

| Period. | £. |
|---|---|
| 1898 (Sept.) | 48,500 |
| 1905 (June) | 36,500 |
| 1908 (June) | **36,000** |
| 1910 (Jan.) | 39,000 |
| 1912 (Dec.) | 58,000 |
| 1914 (June) | 42,500 |
| 1914 (Dec.) | 55,000 |
| 1915 (Jan.) | 60,000 |
| 1915 (June) | 82,500 |
| 1915 (Sept.) | 93,500 |
| 1916 (Jan.) | 125,000 |
| 1916 (June | 180,000 |
| 1917 (Jan.) | 187,500 |
| 1918 (Jan.) | 165,000 |
| 1918 (June) | 180,500 |
| 1919 (Jan.) | 169,000 |
| 1920 (Jan.) | **232,000** |
| 1920 (June) | 180,000 |
| 1921 (Jan.) | 105,000 |
| 1921 (June) | 63,750 |
| 1922 (Jan.) | 60,000 |
| 1922 (June) | 62,000 |
| 1923 (Jan.) | 65,625 |
| 1923 (June) | 62,500 |
| 1924 (Jan.) | 60,000 |
| 1924 (June) | 60,000 |

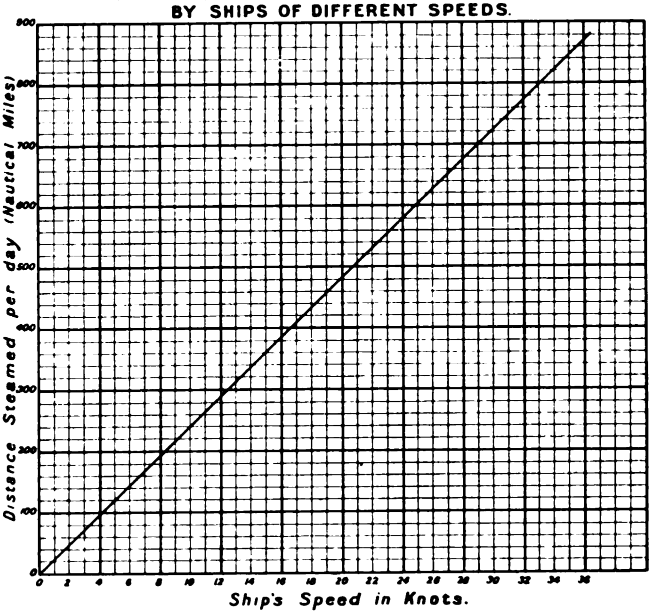
Compiled from "Fairplay," July 3, 1924.

NOTE.—The highest and lowest prices are given in heavy type.

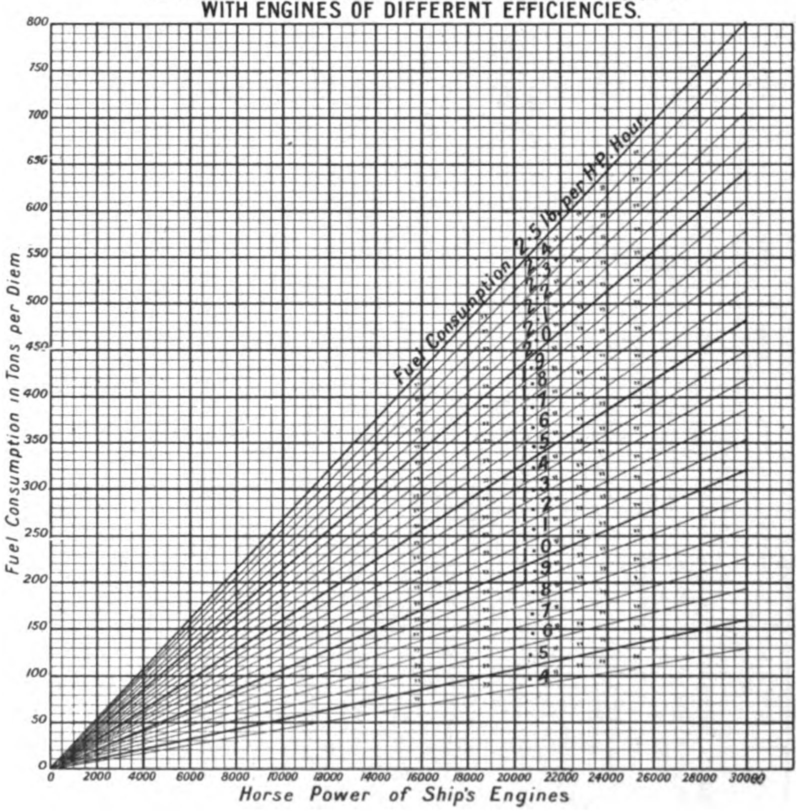
## IMPORTANT DATES IN THE DEVELOPMENT OF MARINE PROPELLING MACHINERY.

| — | Approximate Date of Introduction in the United Kingdom. | | | |
|---|---|---|---|---|
| | Merchant. | | Naval. | |
| Compound engines | — | 1860 | — | 1865 |
| Triple-expansion engines | — | 1880 | — | 1885 |
| Quadruple-expansion engines | — | 1890 | Not fitted | — |
| Cylindrical boilers | — | 1862 | — | 1869 |
| Water-tube boilers | Cross-channel | 1911 | Destroyers | 1893 |
| | Ocean liners | 1914 | Battleships | 1897 |
| Direct turbines | Cross-channel | 1901 | Destroyers | 1898 |
| | Ocean liners | 1905 | Light cruisers | 1904 |
| | | | Battleships | 1906 |
| Combination engines and turbines | Intermediate liner | 1908 | (For cruising only) | 1902 |
| Geared turbines | Single-reduction | 1911 | Single-reduction | 1913 |
| | Double-reduction | 1916 | Not fitted | — |
| Electric propulsion | First attempts | 1904 | Not fitted | — |
| | Modern plant | 1912 | — | — |
| Oil fuel burning | First attempts | 1870 | Coal and oil— | |
| | | | Destroyers | 1902 |
| | | | Battleships | 1904 |
| | Modern plant | 1892 | Oil alone— | |
| | | | Destroyers | 1910 |
| | | | Battleships | 1913 |
| Heavy oil engines | First attempts | 1904 | Tender | 1914 |
| | Modern plant | 1910 | Submarines | 1908 |

DIAGRAM SHOWING DISTANCE STEAMED IN ONE DAY BY SHIPS OF DIFFERENT SPEEDS.



DAILY FUEL CONSUMPTION OF STEAMERS & MOTOR SHIPS WITH ENGINES OF DIFFERENT EFFICIENCIES.



## PROGRESS IN MARINE MACHINERY—ATLANTIC LINERS

| | 1881. | 1888. | 1893. | 1899. | 1907. | 1914. | 1921. |
|---|---|---|---|---|---|---|---|
| Ship Dimensions— | | | | | | | |
| Length . . . . . . . | 500′ 0″ | 528′ 0″ | 600′ 0″ | 685′ 0″ | 760′ 0″ | 865′ 0″ | 912′ 0″ |
| Beam . . . . . . . . | 50′ 0″ | 63′ 0″ | 65′ 0″ | 68′ 5″ | 87′ 6″ | 96′ 6″ | 100′ 0″ |
| Performance— | | | | | | | |
| Speed in Knots . . . . . | 18·0 | 20·1 | 22·0 | 20·7 | 26·0 | 23·5 | 23·5 |
| Horse Power . . . . | 10,680 | 18,500 | 30,000 | 27,000 | 72,500 | 60,000 | 66,000 |
| Engines— | | | | | | | |
| No. of Propellers . . . | One | Two | Two | Two | Four | Four | Four |
| Type of Machinery . . . | Vertical Compound | Vertical Triple Expansion | Vertical Triple Expansion | Vertical Triple Expansion | Steam Turbines | Steam Turbines | Steam Turbines. |
| Cylinders on each shaft . | 68″, 100″, 100″<br>by<br>72″ stroke | 45″, 71″, 113″<br>by<br>60″ stroke | 37″, 37″, 79″, 98″, 98″<br>by<br>69″ stroke | 47½″, 79″, 93″, 93″<br>by<br>72″ stroke | —<br>— | —<br>— | —<br>— |
| Revolutions of Propeller . | 64·2 | 86 | 81 | 78 | 180 | 180 | 180 |
| Piston Speed (f p.m.) . . | 770 | 860 | 930 | 936 | — | — | — |
| Referred M.P. (lb. per sq. in.) | 29·1 | 35·3 | 35 | 35 | — | — | — |
| Boilers— | | | | | | | |
| No. and type . . . . | — Cylindrical | 9 double-ended Cylindrical | 12 double-ended Cylindrical | 15 double-ended Cylindrical | 23 double-ended & 2 single-ended Cylindrical | 21 double-ended Cylindrical | 48 Water-tube (oil-fired) |
| Working-pressure (lb. per sq. in.) . . . . . . | 100 | 150 | 165 | 192 | 195 | 195 | 260 |
| System of Draught . . | Natural Draught | Closed Stokehold | Natural Draught | Assisted Draught | Howden's | Howden's | Forced |
| Heating Surface per H.P. . | 3·3 sq. ft. | 2·75 sq. ft. | 2·73 sq. ft. | 2·77 sq. ft. | 2·19 sq. ft. | 2·31 sq. ft. | 3·33 sq. ft. |
| H.P. per sq. ft. of grate . | 8·57 | 14·3 | 11·4 | 13·75 | 17·9 | 16·9 | 16·4 |
| Total Weight of Machinery "Steam up" . . . . | 1860 tons | 2516 tons | 4935 tons | 4414 tons | 9936 tons | 9302 tons | — |
| H.P. per ton of Machinery | 5·74 | 7·4 | 6·1 | 6·1 | 7·3 | 6·5 | — |
| Coal Consumption per H.P. hour . . . . . . | — | 1·7 lbs. | 1·6 lbs. | — | 1·4 lbs. | 1·3 lbs. | — |

PROGRESS IN MARINE MACHINERY—INTERMEDIATE OCEAN LINERS.*

| Year . . . . | 1880. | 1892. | 1911. | 1914. | 1920. |
|---|---|---|---|---|---|
| Ship dimensions— | | | | | |
| Length . . . . . . . . | 400 ft. | 470 ft. | 520 ft. | 550 ft. | 550 ft. |
| Beam . . . . . . . . | 45 ft. | 53 ft. | 64 ft. | 66 ft. 6 in. | 66 ft. |
| Performance— | | | | | |
| Speed in knots . . . . . | 12·5 | 12·5 | 14·5 | 16·5 | 17 |
| Horse-power . . . . . | 3,000 I.H.P. | 3,500 I.H.P. | 7,500 I.H.P. | 11,000 S.H.P. | 11,000 S.H.P. |
| Engines— | | | | | |
| No. of propellers . . . . | One | Two | Two | Two | Two |
| Type of machinery . . . | Vertical compound | Vertical triple-expansion | Vertical quadruple expansion | Geared steam turbines | Geared steam turbines |
| Dimensions of cylinders . . | 52-in., 96-in. by 66-in. | 22½-in., 36½-in., 60-in. by 48-in. | 26-in., 37-in., 53-in., 76-in. by 54-in. | Two H.P. and two L.P. turbines with single-reduction-gearing | Two H.P. and two L.P. turbines with double-reduction-gearing |
| Propeller (revs. per min.) . | 61 | 80 | 82 | 133 | 85 |
| Piston speed (feet per min.) | 671 | 640 | 738 | Turbine revs. 1,650 | H.P. turbine, revs. 3,200 ; L.P. turbine, revs. 2,000 |
| Referred mean pressure . . | 20·5 | 32·0 | 37 | — | — |
| Condenser surface per H.P. . | 1·85 | 1·6 | 0·84 | 0·80 | 0·62 |
| Boilers— | | | | | |
| No. and type . . . . . . | Two cylindrical | Two D.E. and one S.E. cylindrical | Five double-ended cylindrical | Five double-ended cylindrical | Five water-tube boilers, burning oil fuel (with superheaters) |
| Working pressure (lb. per sq. in.) . . . . . . . | 90 | 170 | 210 | 210 | 250 |
| System of draught . . . | Natural | Natural | Natural | Howden's forced draught | Oil-burning with forced draught |
| Heating surface per H.P. . | 3·1 sq. ft. | 3·3 sq. ft. | 3·25 sq. ft. | 2·5 sq. ft. | 2·25 sq. ft. |
| H.P. per sq. feet of grate . | 7·6 | 10·0 | 11·75 | 17·5 | — |
| Total weight of machinery "Steam up" . . . . . | 685 tons | 795 tons | 1,750 tons | 1,800 tons | 1,210 tons |
| H.P. per ton of machinery . . | 4·35 | 4·4 | 4·25 | 6·1 | 9·1 |
| Coal consumption per H.P. hour | 2·375 lb. | 1·875 lb. | 1·55 lb. | 1·4 lb. | 0·875 lb (Oil). |

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* This and the two succeeding tables are from "Two Centuries of Shipbuilding by the Scotts at Greenock" (1920).

## PROGRESS IN MARINE MACHINERY—CARGO STEAMERS.

| Year | 1877. | 1885. | 1911. | 1914. | 1920. |
|---|---|---|---|---|---|
| Ship dimensions— | | | | | |
| Length | 314 ft. | 320 ft. | 440 ft. | 450 ft. | 503 ft. |
| Beam | 35 ft. | 38 ft. | 52 ft. 6 in. | 56 ft. | 63 ft. |
| Performance— | | | | | |
| Speed in knots | 11·25 | 12·25 | 13·25 | 14·25 | 14·25 |
| Horse-power | 775 I.H.P. | 1,650 I.H.P. | 4,200 I.H.P. | 4,000–5,000 S.H.P. | 7,000 S.H.P. |
| Engines— | | | | | |
| No. of propellers | One | One | One | One | Two |
| Type of machinery | Tandem compound with flywheel | Triple-expansion | Triple-expansion | Steam turbines and single-reduction gearing; one H.P. and one L.P. turbine | Steam turbines and double-reduction gearing; two H.P. and two L.P. turbines |
| Propeller (revs. per min.) | 52 | 70 | 73 | 102 | 80 |
| Piston speed (feet per min.) | 450 | 560 | 750 | 1,350 revs. of turbines | H.P. turbines, 3,500 revs.; L.P. turbines, 2,500 revs. |
| Referred mean pressure | 23 | 31·5 | 35 | — | — |
| Condenser surface per H.P. | 2·17 | 1·83 | 1·5 | 1·18 | 1·12 |
| Boilers— | | | | | |
| No. and type | One-Oval ends and round middle portion | Two cylindrical | Two main cylindrical | Two cylindrical | Three cylindrical oil-fired boilers with superheaters |
| Working pressure (lb. per sq. in.) | 70 | 150 | 190 | 195 | 200 |
| System of draught | Natural | Natural | Forced draught | Howden's forced draught | Oil burning with forced draught |
| Heating surface per H.P. (sq. ft.) | 4·46 | 2·82 | 2·8 | 2·30 | 2·25 |
| H.P. per sq. ft. of grate | 7·6 | 10·4 | 16·25 | 20·0 | — |
| Weights— | | | | | |
| Weight of machinery | 200 | 340 | 900 | 930 | 1,100 |
| H.P. per ton of machinery | 3·87 | 4·85 | 4·67 | 6·45 | 6·35 |
| Coal consumption per H.P. hour | About 2·5 lb. | 1·95 lb. | 1·65 lb. | 1·45 lb. | 0·85 lb. (Oil) |

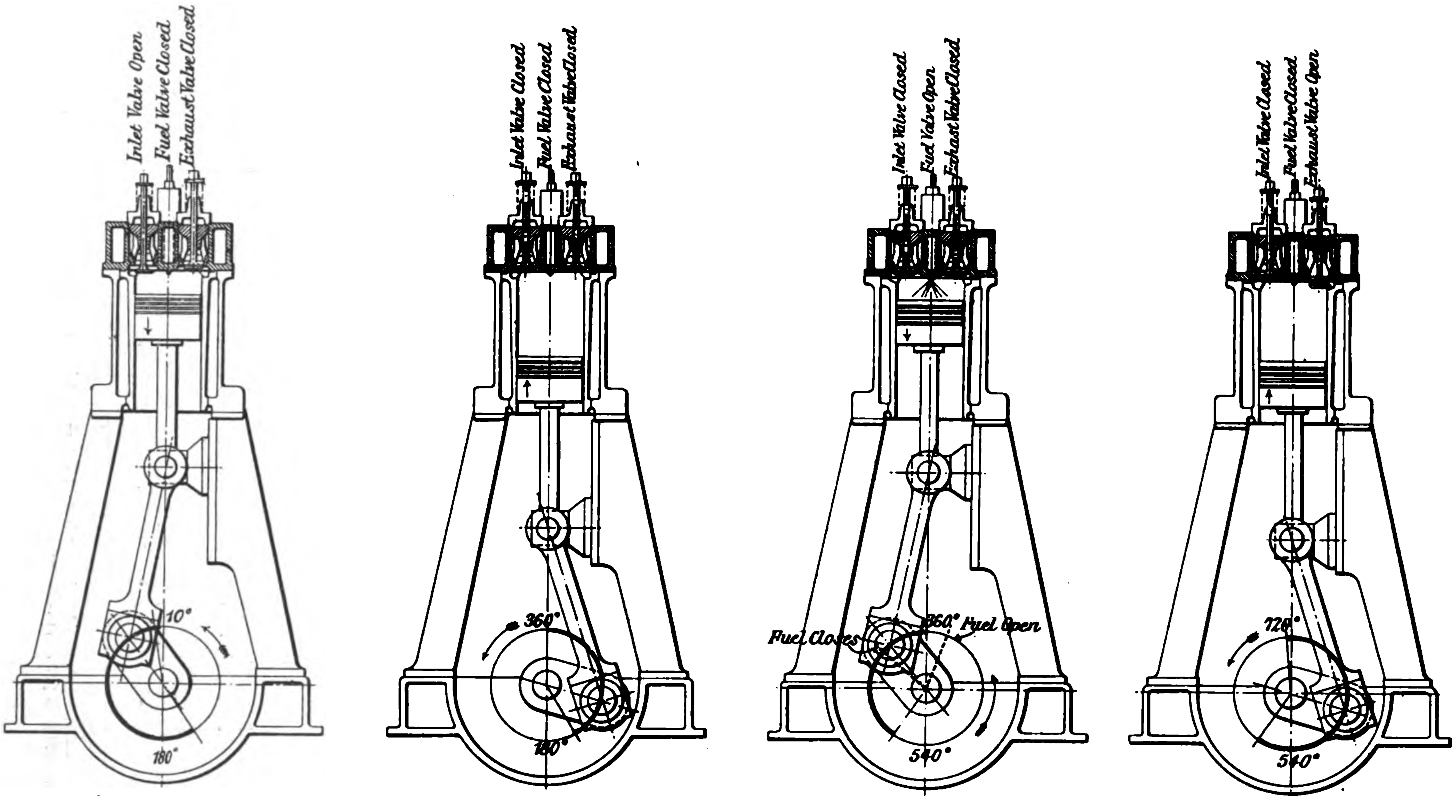
PROGRESS IN MARINE MACHINERY—CROSS-CHANNEL STEAMERS.

| Year . . . . | 1890. | 1898. | 1904. | 1910. | 1920. |
|---|---|---|---|---|---|
| Ship dimensions— | | | | | |
| Length . . . . . . . . | 300 ft. | 315 ft. | 330 ft. | 316 ft. | 302 ft. |
| Beam . . . . . . . . | 34 ft. 6 in. | 37 ft. | 42 ft. | 41 ft. | 35 ft. 6 in. |
| Performance— | | | | | |
| Speed in knots . . . . . | 18 | 19·75 | 19·5 | 21·5 | 23·5 |
| Horse-power . . . . . | 4,400 I.H.P. | 5,520 I.H.P. | 5,500 S.H.P. | 8,500 S.H.P. | 12,300 S.H.P. |
| Engines— | | | | | |
| No. of propellers . . . . | Two | Two | Three | Three | Two |
| Type of machinery . . . | Three-cylinder triple-expansion | Four-cylinder triple-expansion | Direct steam turbines, one H.P. and two L.P. | Direct steam turbines, one H.P. and two L.P. | Geared steam turbines, two H.P. and two L.P. |
| Propeller (revs. per min.). . | 130 | 165 | 550 | 625 | 435 |
| Piston speed (feet per min.) . | 780 | 910 | Turbines, 550 revs. | Turbines, 625 revs. | H.P. turbine, 2,600 revs.; L.P. turbine, 1,800 revs. |
| Referred mean pressure . . | 30·75 | 43·0 | — | — | — |
| Condenser surface per H.P. . | 1·42 | 1·4 | 1·35 | 0·75 | 0·6 |
| Boilers— | | | | | |
| No. and type . . . . . | Five S.E. cylindrical | Four S.E. cylindrical | Two D.E. and one S.E. cylindrical | Seven water-tube | Eight water-tube |
| Working pressure (lb. per sq. in.) . . . . . . . | 160 | 180 | 150 | 190 | 195 |
| System of draught . . . | Natural | Forced | Forced | Forced | Forced |
| Heating surface per H.P. (sq.ft.) | 2·6 | 1·95 | 1·9 | 1·95 | 2 |
| H.P. per sq. ft. of grate . . | 12·25 | 17·5 | 16·5 | 15·0 | 22·0 |
| Total weight of machinery— | | | | | |
| Steam up . . . . . . | 590 tons | 610 tons | 590 tons | 735 tons | 1,055 tons |
| H.P. per ton of machinery . . | 7·45 | 9·62 | 9·3 | 11·6 | 11·65 |
| Coal consumption per H.P. hour | 2·25 lb. | 2·1 lb. | 1·8 lb. | 1·7 lb. | 1·50 lb. |

## PROGRESS IN MARINE MACHINERY—MOTOR SHIPS.

| | 1909. | 1910. | 1912. | 1914. | 1916. | 1922. |
|---|---|---|---|---|---|---|
| Ship Dimensions— | | | | | | |
| Length | 210 ft. | 260 ft. | 380 ft. | 425 ft. | 450 ft. | 502 ft. |
| Beam | 38 ft. | 43 ft. | 53 ft. | 55 ft. | 57 ft. | 62 ft. |
| Performance— | | | | | | |
| Speed | 8½ knots | 10½ knots | 11 knots | 11¼ knots | 12 knots | 13½ knots |
| Indicated horse-power | 490 | 1,460 | 2,500 | 3,100 | 4,000 | 6,400 |
| Engines— | | | | | | |
| No. of propellers | 1 | 1 | 2 | 2 | 2 | 2 |
| Type of engine | 4-cycle single acting | 4-cycle single acting | 4-cycle single acting | 4-cycle single acting | 4-cycle single acting | 4-cycle single acting |
| Cylinders per shaft | 6 | 6 | 8 | 6 | 6 | 8 |
| Bore | 15¾ in. | 22 in. | 20⅞ in. | 24⅞ in. | 29⅛ in. | 29⅛ in. |
| Stroke | 23⅞ in. | 39⅜ in. | 28¾ in. | 37⅞ in. | $43\frac{5}{16}$ in. | 45¼ in. |
| Revolutions per minute | 140 | 125 | 140 | 125 | 100 | 115 |
| Piston speed in feet per minute | 550 | 820 | 670 | 785 | 725 | 865 |
| Mean pressure, lbs. per square inch— | | | | | | |
| I.H.P. basis | 99 | 111 | 89·8 | 89·5 | 91 | 91·5 |
| B.H.P. basis | 75 | 83 | 68 | 67 | 68 | 69 |
| Type of Auxiliaries | Steam | Steam | Electric | Electric | Electric | Electric |
| Total weight of machinery | 91 tons | 220 tons | 390 tons | 475 tons | 600 tons | 940 tons |
| B.H.P. per ton of machinery | 4·3 | 5 | 4·8 | 4·9 | 5 | 5·1 |
| Oil consumption for all purposes per B.H.P.-hour | 0·6 lb. | 0·5 lb. | 0·47 lb. | 0·45 lb. | 0·45 lb. | 0·45 lb. |

MARINE DIESEL ENGINE, FOUR-CYCLE TYPE, DIAGRAM OF OPERATIONS.



**INDUCTION**
Inlet Valve Opens - 10°
" " Closes - 210°

**COMPRESSION**

**FIRING**
Fuel Valve Opens - 340°
" " Closes - 410°

**EXHAUST**
Exhaust Valve Opens - 505°
" " Closes - 725°

## COMPARISONS OF STEAM AND OIL-ENGINED VESSELS.

The table given herewith of comparisons of the cost of operating steam and oil-engined vessels is the same as was given in last year's issue of "Brassey's Annual," page 614.

The savings consequent upon the installation of Diesel machinery compel attention. The relative positions occupied by vessels propelled by the various types of prime movers will be noted.

It is impossible in any such comparisons to take fully into account all the factors which may operate in the case of vessels trading on different routes, but it is hoped that the figures given herewith will indicate the nature of the relative costs.

The following savings, which are effected by the installation of Diesel machinery, have not been taken into account: less fuelling costs, demurrage, no stand-by losses, less cleaning ship, higher average speed in a seaway, reduced fuelling appliances required, etc.

| | DIESEL ENGINES. | RECIPROCATING STEAM-ENGINES. | | TURBINES. |
|---|---|---|---|---|
| Type of propelling machinery. | 4-cycle single-acting reversible, crosshead. Diesel electric-driven auxiliaries. | Triple-expansion engines, cylindrical boilers, Howden's forced draught, Superheat, 50° Fahr. | | With reduction gearing, oil fired, Superheat, 150° Fahr. |
| | | *Coal-Fired Boilers.* | *Oil-Fired Boilers.* | |
| Total deadweight in tons | 10,050 | 10,230 | 10,235 | 10,235 |
| Freight-earning cargo in tons . . . . . . | 9,357 | 7,880 | 8,555 | 8,743 |
| Average sea-power, horse-power . . . | 2,500<br>(Shaft) | 2,800<br>(Indicated) | 2,800<br>(Indicated) | 2,500<br>(Shaft) |
| Radius of action in miles | 10,500 | 10,500 | 10,500 | 10,500 |
| Fuel consumption per brake horse-power hour, including auxiliaries, in lb. . . . . | 0·45 | 2·0 | 1·4 | 1·1 |
| * Fuel consumption per day in tons . . . | 12·1 | 53·5 | 37·5 | 29·5 |
| Fuel consumption per voyage of 16 days, in tons . . . . . . | 194 | 856 | 600 | 472 |
| COMPARATIVE COSTS OF WORKING. | | | | |
| Provisions, total per month . . . . . | £151 | £184 15*s.* 0*d.* | £156 10*s.* 0*d.* | £156 10*s.* 0*d.* |
| Wages, total per month . | £404 | £468 | £408 | £408 |
| Fuel, per 16 days' sailing | £776<br>(£4 0*s.* 0*d.* per ton) | £1,070<br>(£1 5*s.* 0*d.* per ton) | £1,800<br>(£3 0*s.* 0*d.* per ton) | £1,416<br>(£3 0*s.* 0*d.* per ton) |
| Fuel, per month of 24 days' sailing . . . | £1,164 | £1,605 | £2,700 | £2,124 |
| Cost of running for one year of 288 days' sailing | £20,628 | £27,096 | £39,168 | £32,265 |
| Tons of freight-earning cargo carried, assuming 9 round voyages per year, each of 32 days' total sailing out and home . . . . . | 168,426 | 141,840 | 153,990 | 157,274 |
| Cost per ton of cargo carried per 16 days' sailing out and home . | 2*s.* 5*d.* | 3*s.* 10*d.* | 5*s.* 1*d.* | 4*s.* 1*d.* |
| Cost per ton-mile . . | ·0076*d.* | ·0114*d.* | ·0152*d.* | ·0121*d.* |

* Calorific value of oil fuel taken at 19,000 B.Th.U.'s. Calorific value of coal taken at 13,500 B.Th.U.'s.

NOTE.—No cognizance has been taken in the above table of the fact that with Diesel ships, bunker fuel oil, costing £3 per ton, can be used.

# LIST OF IMPORTANT DIESEL SHIPS IN SERVICE AND BUILDING, GIVING PARTICULARS OF THEIR MACHINERY.

| Date. | Name of vessel. | Makers of machinery. | Type of engine. | Cycle. | No. of eng. | Total B.H.P. | I.H.P. per engine. | B.H.P. per engine. | No. of cyl. per eng. | B.H.P. per cyl. | Diameter of cyl. in ins. | Stroke in ins. | Ratio stroke to bore. | Revs. per min. | Piston speed. Ft. per min. | M.E.P. on B.H.P. basis. | M.I.P. on I.H.P. Basis. | Consumption of fuel in lbs. per sq. in. piston area. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1912* | Juno | Werkspoor | Werkspoor | 4 single act. | 1 | 1,100 | 1,460 | 1,100 | 6 | 183 | $21\frac{1}{8}$ | $39\frac{3}{8}$ | 1·87 | 125 | 820 | 84·0 | 111·0 | 0·219 |
| 1919* | Aba (ex-Glenapp) | Harland & Wolff | Burmeister and Wain | 4 single act. | 2 | 5,250 | 3,200 | 2,625 | 8 | 328 | $29\frac{1}{2}$ | $43\frac{5}{16}$ | 1·46 | 115 | 830 | 76·0 | 93·0 | 0·202 |
| 1920* | Glenogle | Harland & Wolff | Burmeister and Wain | 4 single act. | 2 | 5,250 | 3,200 | 2,625 | 8 | 328 | $29\frac{1}{8}$ | $45\frac{1}{4}$ | 1·55 | 115 | 865 | 75·0 | 91·5 | 0·206 |
| 1920* | Ansaldo III | Ansaldo San Giorgio | Ansaldo | 2 single act. | 2 | 2,400 | 1,600 | 1,200 | 4 | 300 | $24\frac{13}{16}$ | $35\frac{7}{16}$ | 1·43 | 110 | 650 | 63·0 | 84·0 | 0·272 |
| 1921* | Domala | N.B. Diesel Co. | N.B. Diesel | 4 single act. | 2 | 4,000 | 2,500 | 2,000 | 8 | 250 | $26\frac{1}{2}$ | 47 | 1·77 | 96 | 752 | 79·5† | 99·5 | 0·191 |
| 1921* | Sardinia | Werkspoor | Werkspoor | 4 single act. | 1 | 1,600 | 2,140 | 1,600 | 6 | 267 | $26\frac{3}{8}$ | $47\frac{1}{4}$ | 1·79 | 110 | 865 | 74·5 | 100·0 | 0·205 |
| 1922* | Pizarro | Beardmore & Co. | Beardmore-Tosi | 4 single act. | 1 | 1,250 | 1,670 | 1,250 | 6 | 208 | $24\frac{3}{8}$ | $38\frac{3}{8}$ | 1·57 | 115 | 735 | 76·0 | 100·0 | 0·185 |
| 1922* | Scottish Musician | Vickers, Ltd. | Vickers | 4 single act. | 2 | 2,500 | 1,620 | 1,250 | 6 | 208 | $24\frac{1}{2}$ | 39 | 1·59 | 118 | 767 | 76·0 | 99·0 | 0·185‡ |
| 1922* | Dominion Miller | Doxford | Doxford | 2 opposed p. | 1 | 2,700 | 3,000 | 2,700 | 4 | 675 | $22\frac{13}{16}$ | $91\frac{1}{4}$ comb'd. | 2·0 | 77 | 585 | 93·0 | 103·0 | 0·362‡ |
| 1922* | Loch Katrine | Harland & Wolff | Burmeister and Wain | 4 single act. | 2 | 5,250 | 3,200 | 2,625 | 8 | 328 | $29\frac{1}{8}$ | $45\frac{1}{4}$ | 1·55 | 115 | 865 | 75·0 | 91·5 | 0·206 |
| 1923* | Dalgoma | Stephen & Sons | Sulzer | 2 single act. | 2 | 3,200 | 2,200 | 1,600 | 4 | 400 | $26\frac{3}{4}$ | $43\frac{5}{16}$ | 1·62 | 85 | 613 | 76·5 | 105·0 | 0·312 |
| 1923* | Medon | Götaverken | Burmeister and Wain | 4 single act. | 1 | 2,400 | 3,100 | 2,400 | 8 | 300 | $29\frac{1}{8}$ | $59\frac{1}{16}$ | 2·02 | 85 | 838 | 71·0 | 92·0 | 0·192§ |
| 1923 | Arnus | Swan Hunter & Wigham Richardson | Neptune-Polar | 2 single act. | 2 | 2,100 | 1,400 | 1,050 | 6 | 175 | 17 | 35 | 2·06 | 125 | 730 | 70·0 | 98·0 | 0·33 |
| 1923 | Sycamore | Richardsons, Westgarth | Beardmore-Tosi | 4 single act. | 2 | 2,500 | 1,670 | 1,250 | 6 | 208 | $24\frac{3}{8}$ | $38\frac{3}{8}$ | 1·57 | 120 | 767 | 74·0 | 98·0 | 0·187 |
| 1923 | Donaldson Liner | Vickers, Ltd. | Vickers | 4 single act. | 1 | 2,700 | 3,500 | 2,700 | 8 | 338 | 30 | 45 | 1·5 | 110 | 825 | 76·0 | 99·0 | 0·22‡ |
| 1924 | Dolius | Scott Ship. & Eng. Co. | Still | 2 double act. | 2 | 2,500 | 1,500 | 1,250 | 4 | 312 | 22 | 36 | 1·64 | 120 | 720 | 70 oil<br>6 steam | 84 oil<br>7·2 st'm | 0·28 ‖ |
| 1924 | Camrank | Sulzer | Sulzer | 2 single act. | 2 | 3,400 | 2,400 | 1,700 | 4 | 425 | $26\frac{3}{4}$ | $43\frac{1}{4}$ | 1·62 | 85 | 612 | 81·0 | 115·0 | 0·333 |
| 1924 | Aorangi | Fairfield S. & E. Co. | Sulzer | 2 single act. | 4 | 13,000 | 4,400 | 3,250 | 6 | 542 | $27\frac{1}{2}$ | 39 | 1·42 | 135 | 880 | 68·5 | 93·0 | 0·382 ¶ |
| 1924 | British Aviator | Cammell Laird & Co. | Camellaird-Fullagar | 2 opposed p. | 1 | 3,000 | 4,000 | 3,000 | 6 | 500 | 23 | 72 comb'd. | 1·56 | 86 | 516 | 77·0 | 102·0 | 0·258 |
| 1924 | Swanley | N.B. Diesel Co. | N.B. Diesel | 2 double act. | 1 | 2,000 | 2,750 | 2,000 | 3 | 667 | $24\frac{1}{2}$ | 44 | 1·8 | 100 | 735 | 64·0 | 88·0 | 0·296 |
| 1924 | Gripsholm | Burmeister & Wain | Burmeister and Wain | 4 double act. | 2 | 13,500 | 8,800 | 6,750 | 6 | 1,125 | $31\frac{1}{2}$ | $55\frac{1}{8}$ | 1·75 | 125 | 1,250 | 77·0 | 99·5 | 0·3 |

* In operation at sea.

† No compressor on engine.

‡ Solid injection.

§ Longstroke type.

‖ Solid injection. Oil and steam.

¶ Quadruple screw.

# LIST OF THE PRINCIPAL COMMERCIAL FUEL-OIL BUNKERING STATIONS ESTABLISHED THROUGHOUT THE WORLD.

VARIOUS publications, British and American, interested in oil or shipping matters furnish particulars from time to time of fuel oil bunkering stations, either by way of more or less comprehensive general lists or of announcements by oil distributing companies. Some of the more comprehensive lists, whilst valuable as showing the widespread provision of fuel oil supplies already made or contemplated, do not in all cases, however, distinguish between installations in actual operation and those under construction, or clearly indicate whether Government installations are the only ones existing at particular ports. In compiling the following list from many sources, our aim has been to specify the principal bunkering ports at which commercial oil installations are in operation. Whilst absolute accuracy cannot be guaranteed, much care has been taken to eliminate errors.

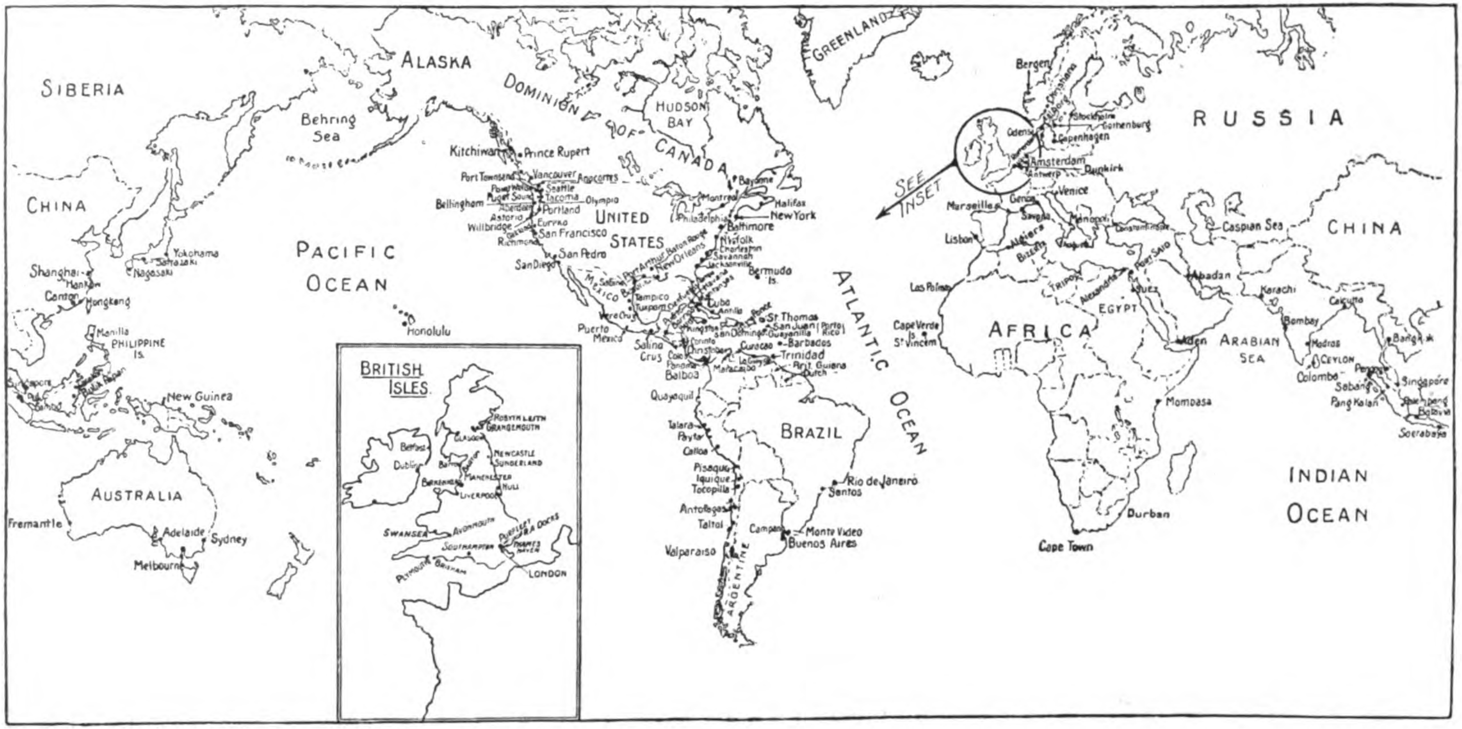
Aalborg (Denmark)
Aarhus
Abadan (Persia)
Aberdeen
Adelaide
Aden
Ajaccio
Alexandria
Algiers
Almeria
Amoy (China)
Amsterdam
Ango-Ango (Congo)
Antilla
Antofagasta (Chile)
Antwerp
Aomori
Arica (Chile)
Astoria
Augusta (Sicily)
Avonmouth
Azores (Ponta Delgada)
Bahia Blanca (Arg.)
Bahia (Brazil)
Balbo (Panama)
Balik Pappan (Borneo)
Baltimore
Bangkok (Siam)
Barcelona
Barranquilla (Colombia)
Barrow
Batavia
Baton Rouge (La.)
Batum
Bayonne, N.J.
Beaumont (Texas)
Beira
Belfast
Belize (Honduras)
Bergen
Bermuda
Bilbao
Birkenhead
Bizerta (Tunis)
Boelbaai Ceram
Boma (Congo)
Bombay
Bordeaux
Boston (U.S.A.)
Bourgas (Turkey)
Bremen
Brest
Bridgetown (Barbadoes)
Brighton (Trinidad)
Brixham
Brunsbuettel-Ostermoor
Brunswick
Buenos Aires
Cadiz
Calcutta
Caleta Buena (Chile)
Callao
Campana
Canton
Cape Town
Cardiff
Casablanca
Cebu (Philippines)
Ceram (D.E.I.)
Ceuta
Charleston
Cherbourg
Chittagong (India)
Christiania
Cienfuegos (Cuba)
Civita Vecchia
Claxton Bay (Trinidad)
Cochin (India)
Colombo
Colon (Pan. Canal)
Conception del Uruguay
Constanza
Constantinople
Copenhagen
Corinto (Nicaragua)
Corunna
Cristobal
Curacao
Destrehan
Donges
Dover
Dublin
Dunkirk
Durban
Emden
Eten (Peru)
Falmouth
Fall River (Mass.)
Fayal
Ferrol
Folkestone
Foochow
Fort William (Ont.)
Foynes
Fredericia
Fremantle
Funchal
Galveston
Gemsah
Genoa
Georgetown
Gibraltar
Glasgow
Gothenburg
Granatello (Italy)
Graney Island (Va.)
Grangemouth
Granton
Guayaquil
Gulf Port (Miss.)
Halifax (Canada)
Hamburg
Hamilton (Ont )
Hankow
Harwich
Havana
Havre
Helsingfors
Hong Kong
Honolulu
Houston (Texas)
Hull
Hurghada
Ichang (China)
Ilo Ilo (Philip. Is.)
Immingham
Iquique (Chile)
Itosaki
Jacksonville (Fla.)
Jarrow-on-Tyne
Junin (Chile)
Karachi
Ketchikan
Kettle Point (R.I.)
Key West
Kiel
Kingston (Jamaica)
Kobe
La Guayra (Venez.)
La Pallice
La Rochelle
Las Palmas
Leghorn
Leith
Levis
Lisbon
Liverpool
Lobitos
London :
  Thameshaven, Purfleet, etc.
Lorient
Los Angeles
Lourenço Marques
Macassar (Celebes)
Madras
Malmo
Malta
Manati (Cuba)
Manchester Ship Canal
Manila
Maracaibo (Venez.)

Marmagoa (India)
Marseilles
Mantanzas (Cuba)
Mauritius
Mejillones (Chile)
Melbourne
Middlesbrough
Minatitlan (Mexico)
Miri
Mobile (Alabama)
Mollendo (Peru)
Mombasa
Monopoli
Montevideo
Montreal
Nagasaki
Naples
Neuvitas
Newcastle-on-Tyne
New Orleans
New York
Niigata (Japan)
Nonai
Nordenham
Norfolk (Va.)
Nyborg
Odense (Denmark)
Oleum (Cal., U.S.A.)
Oran
Paitaz (Peru)
Pago Pago (Samoa)
Palembang (Sumatra)
Palermo
Palo Blanco (Mex.)
Pangkalan - Berandan
Papeete (Tahiti)
Para (Brazil)
Paramaribo (Dutch Guiana)
Passaic (N.J.)
Payta
Penang
Pensacola (Florida)
Perim
Pernambuco
Philadelphia
Piræus
Pisagua
Plymouth
Point à Pierre (Trinidad)
Point Fortin (Trinidad)
Point Wells
Ponce
Ponta Delgada (Azores)
Port Arthur (Texas)
Port Edgar
Portici
Portishead
Portland (Maine)
Portland (Ore.)
Port of Spain
Port St. Luis du Rhone (France)
Port Said
Port Sudan
Prince Rupert (B.C.)
Providence (R I.)
Puerto Barrios (Guatemala)
Puerto Cabello (Venez.)
Puerto Mexico
Puloe Samboe
Pulo Bukom
Quebec
Regla (Cuba)
Richmond (Va.)
Rangoon
Rio de Janeiro
Rochefort
Rotterdam
Rouen
Sabine
Sabang
Saigon (French Cochin China)
Saitozaki
St. Georges
St. John (N.B.)
St. Nazaire
St. Thomas
St. Vincent
Salina Cruz (Mex.)
Salinas (Chili)
Salonica
San Antonio (Chile)
San Diego
San Domingo
San Francisco
San Juan (P. Rica)
San Luis Obispo (Cal., U.S.A.)
San Pedro (Cal.)
Santander
Santos (Brazil)
Sarnia
Savannah
Savona
Seattle (Wash.)
Shanghai
Singapore
Smyrna
Soerabaya (Java)
Southampton
South Shields
Spezia
Stavanger
Stettin
Stockholm
Strasburg
Suez
Sunderland
Supe (Peru)
Svolvaer (Norway)
Swansea
Swatow (China)
Sydney
Tacoma
Talara (Peru)
Taltal (Chile)
Tambes (Peru)
Tampa (Florida)
Tampico (Mexico)
Tarakan (Borneo)
Teneriffe
Tientsin
Tocopilla (Chile)
Toronto
Toulon
Trieste
Trinidad
Trondjhem
Tsuchizaki (Japan)
Tunis
Tuticorin (India)
Tuxpam (Mexico)
Vado
Vallo (Norway)
Valparaiso
Vancouver
Venice
Vera Cruz (Mexico)
Victoria (B.C.)
Wellington (N.Z.)
Willbridge
Willemstad (Curacao)
Yati (Paraguay)
Yokohama
Zanzibar

## NUMBER AND TONNAGE OF MOTOR VESSELS (INCLUDING VESSELS FITTED WITH AUXILIARY MOTORS) OWNED BY VARIOUS NATIONS.

| | June, 1922. | | June, 1923. | | June, 1924. | |
|---|---|---|---|---|---|---|
| | No. | Gross tonnage | No. | Gross tonnage. | No. | Gross tonnage. |
| United Kingdom | 214 | 355,461 | 221 | 393,283 | 260 | 526,693 |
| British Dominions | 99 | 36,973 | 112 | 38,262 | 130 | 41,350 |
| United States | 147 | 188,283 | 168 | 192,595 | 193 | 248,234 |
| Denmark | 104 | 165,810 | 112 | 160,034 | 106 | 189,749 |
| Holland | 95 | 75,684 | 96 | 76,322 | 107 | 80,202 |
| France | 65 | 33,656 | 69 | 42,737 | 55 | 33,320 |
| Germany | 99 | 73,127 | 97 | 108,662 | 147 | 151,705 |
| Italy | 91 | 88,330 | 98 | 93,274 | 88 | 90,500 |
| Japan | 8 | 6,090 | 146 | 29,312 | 157 | 31,816 |
| Norway | 240 | 197,973 | 226 | 213,438 | 207 | 220,541 |
| Spain | 47 | 18,104 | 49 | 23,762 | 66 | 28,242 |
| Sweden | 160 | 166,679 | 196 | 194,337 | 211 | 215,681 |
| Other countries | 224 | 134,293 | 205 | 100,367 | 223 | 117,765 |
| World's total | 1,593 | 1,540,463 | 1,795 | 1,666,385 | 1,950 | 1,975,798 |

MAP OF THE WORLD SHOWING PRINCIPAL PORTS WHERE OIL STORAGE IS PROVIDED.



(*Reprinted from " The Motor Ship.*")

## PRODUCTION OF CRUDE OIL IN VARIOUS REGIONS.

| Country. | Production of Crude Petroleum in— | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1880. | 1890. | 1900. | 1910. | 1919. | 1920. | 1921. | 1922. | 1923. |
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. |
| **North America**: | | | | | | | | | |
| Atlantic Seaboard . | 3,550,000 | 6,170,000 | 7,940,000 | 16,750,000 | 34,770,000 | 42,890.000 | 44,581,000 | 51,997,000 | 55,398,000 |
| Pacific Seaboard . | 10,000 | 50,000 | 670,000 | 11,230,000 | 15,630,000 | 16,260,000 | 18,063,000 | 22,364,000 | 41,386,000 |
| **Mexico** . . . . . | — | — | — | 540,000 | 13,000,000 | 24,330,000 | 28,865,000 | 27,206,000 | 22,309,000 |
| **Trinidad** . . . . | — | — | — | 20,000 | 260,000 | 300,000 | 330,000 | 340,000 | 429,000 |
| **South America**: | | | | | | | | | |
| Atlantic Seaboard . | — | — | — | — | 210,000 | 280,000 | 471,000 | 772,000 | 1,045,000 |
| Pacific Seaboard . | — | — | 40,000 | 180,000 | 350,000 | 370,000 | 493,000 | 757,000 | 914,000 |
| **Asia**: | | | | | | | | | |
| India, East Indies, Persia, Japan, etc. | — | 30,000 | 570,000 | 2,610,000 | 4,760,000 | 5,160,000 | 6,394,000 | 6,783,000 | 7,156,000 |
| **Africa**: | | | | | | | | | |
| Egypt . . . . | — | — | — | — | 230,000 | 150,000 | 179,000 | 158,000 | 138,000 |
| **Europe**: | | | | | | | | | |
| Russia . . . . | 410,000 | 3,930,000 | 10,380,000 | 9,640,000 | 4,580,000 | 3,520,000 | 3,993,000 | 4,516,000 | 5,228,000 |
| Roumania . . . | 20,000 | 50,000 | 230,000 | 1,310,000 | 920,000 | 1,030,000 | 1,145,000 | 1,330,000 | 1,466,000 |
| Elsewhere . . . | 30,000 | 110,000 | 380,000 | 1,920,000 | 920,000 | 850,000 | 795,000 | 866,000 | 851,000 |
| Total . . . . | 4,020,000 | 10,340,000 | 20,210,000 | 44,200,000 | 75,630,000 | 95,140,000 | 105,309,000 | 117,089,000 | 136,320,000 |
| Percentages of increase | 425 over 1870 | 157·2 over 1880 | 95·3 over 1890 | 118·8 over 1900 | 71·2 over 1910 | 26 over 1919 or 117 over 1910 | 10·7 over 1920 | 11·4 over 1921 | 16·4 over 1922. |

Note.—The figures in the above table may be taken as approximately accurate, allowing for the more or less exact methods of various tabulators, *e.g.* in converting "barrels" to tons, etc. This is often done roughly by taking seven barrels to the ton without reference to the varying specific gravities of particular oils. The later figures for Russia, and in one or two other instances where authoritative returns are not published, have had to be partly estimated.

## HIGHEST AND LOWEST IRON AND STEEL PRICES FOR THE YEARS 1914–1924.

| | 1914. | 1915. | 1916. | 1917. | 1918. | 1919. | 1920. | 1921. | 1922. | 1923 | 1924 (to September). |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Marked Iron Bars, | 9 0 0 | 13 0 0 | 15 10 0 | 15 10 0 | 20 0 0 | 25 10 0 | 33 10 0 | 33 10 0 | 16 0 0 | 14 10 0 | 15 0 0 |
| S. Staffs . . . | 8 10 0 | 9 0 0 | 13 10 0 | | 14 15 0 | 18 0 0 | 26 15 0 | 16 0 0 | 13 10 0 | 13 10 0 | 14 10 0 |
| Common Iron Bars, | 8 2 6 | 13 2 6 | 15 0 0 | 15 0 0 | 20 0 0 | 23 0 0 | 30 0 0 | 27 10 0 | 13 0 0 | 12 0 0 | 12 10 0 |
| Cleveland . . . | 7 10 0 | 8 0 0 | 13 0 0 | 13 15 0 | 14 15 0 | 15 10 0 | 24 5 0 | 12 10 0 | 10 10 0 | 10 10 0 | 12 0 0 |
| Steel Ship Plates, ⅜-in., | 7 10 0 | 11 0 0 | 14 5 0 | 13 10 0 | 16 10 0 | 22 0 0 | 24 10 0 | 24 0 0 | 10 10 0 | 10 10 0 | 10 10 0 |
| Middlesbrough . | 7 0 0 | 8 0 0 | 11 0 0 | 11 10 0 | 11 10 0 | 11 10 0 | 20 0 0 | 10 10 0 | 9 0 0 | 9 0 0 | 9 10 0 |
| Steel Ship Angles, | 7 5 0 | 10 15 0 | 18 2 6 | 18 2 6 | 16 2 6 | 18 5 0 | 24 0 0 | 24 0 0 | 10 0 0 | 10 0 0 | 11 0 0 |
| Middlesbrough . | 6 15 0 | 7 15 0 | 10 15 0 | 11 2 6 | 11 2 6 | 11 2 6 | 19 10 0 | 10 0 0 | 8 12 6 | 8 10 0 | 9 5 0 |
| Steel Ship Plates, | 7 5 0 | 11 17 6 | 13 15 0 | 14 15 0 | 16 10 0 | 23 15 0 | 28 5 0 | 25 10 0 | 10 10 0 | 10 15 0 | 10 5 0 |
| Glasgow . . . | 6 17 6 | 7 2 6 | 11 10 0 | 11 10 0 | 11 10 0 | 11 10 0 | 21 10 0 | 10 10 0 | 8 5 0 | 8 15 0 | |
| Steel Ship Angles, | 7 0 0 | 12 10 0 | 18 2 6 | 18 2 6 | 18 2 6 | 19 5 0 | 26 10 0 | 24 10 0 | 10 0 0 | 11 5 0 | 10 0 0 |
| Glasgow . . . | 6 7 6 | 7 0 0 | 11 2 6 | 11 2 6 | 11 2 6 | 11 2 6 | 19 10 0 | 11 0 0 | 8 5 0 | 8 5 0 | |
| Steel Boiler Plates, | 8 5 0 | 13 0 0 | 14 10 0 | 14 10 0 | 17 10 0 | 23 0 0 | 31 0 0 | 31 0 0 | 14 10 0 | 14 0 0 | 14 0 0 |
| Middlesbrough . | 8 0 0 | 8 5 0 | 12 10 0 | 12 10 0 | 12 10 0 | 12 10 0 | 23 0 0 | 14 10 0 | 12 10 0 | 12 0 0 | 13 10 0 |
| Steel Boiler Plates, | 7 5 0 | 12 17 6 | 14 15 0 | 15 5 0 | 17 10 0 | 24 10 0 | 31 10 0 | 31 10 0 | 14 10 0 | 14 0 0 | 13 10 0 |
| Glasgow . . . | 7 0 0 | 7 2 6 | 12 10 0 | 12 10 0 | 12 10 0 | 12 10 0 | 24 0 0 | 14 0 0 | 12 10 0 | 12 0 0 | |

## HIGHEST AND LOWEST FUEL OIL PRICES FOR THE YEARS 1914–1924.

| | 1914. | 1915. | 1916. | 1917. | 1918. | 1919. | 1920. | 1921. | 1922. | 1923 | 1924 (to September). |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Heavy . . . . . | 3 2 0<br>2 5 0 | 5 6 0<br>2 10 0 | 8 0 0<br>7 0 0 | 11 5 0<br>9 0 0 | 8 10 0 | 6 10 0 | 13 0 0<br>9 17 6 | 8 0 0<br>3 15 0 | 3 15 0<br>3 0 0 | 3 10 0<br>3 0 0 | 4 7 6<br>3 12 6 |
| Light . . . . . | 3 10 0<br>2 15 0 | 5 19 0<br>3 0 0 | 9 0 0<br>7 5 0 | 16 10 0<br>10 0 0 | 9 10 0 | 7 10 0 | 15 0 0<br>11 5 0 | 11 0 0<br>5 5 0 | 5 5 0<br>4 0 0 | 4 5 0<br>4 0 0 | 5 7 6<br>4 7 6 |

## "EXPORTS" OF NEW SHIPS FROM THE UNITED KINGDOM.

### SHIPS NOT REGISTERED AS BRITISH, WITH THEIR MACHINERY.

| Year. | War Vessels. | Steam Ships (other than War Vessels). | | Sailing Ships (other than War Vessels) including Boats. | Total of New Ships. |
|---|---|---|---|---|---|
| | | Hulls and Fittings. | Machinery. | | |
| | £ | £ | £ | £ | £ |
| 1903 | 74,480 | 2,798,737 | 1,222,108 | 188,504 | 4,283,829 |
| 1904 | 388,600 | 2,570,835 | 1,164,779 | 330,937 | 4,455,151 |
| 1905 | 50,000 | 3,693,422 | 1,516,183 | 171,693 | 5,431,298 |
| 1906 | 2,800,000 | 3,973,873 | 1,668,592 | 201,706 | 8,644,171 |
| 1907 | 554,700 | 6,586,449 | 2,550,702 | 326,262 | 10,018,113 |
| 1908 | 1,879,994 | 5,902,428 | 2,505,280 | 189,773 | 10,567,475 |
| 1909 | 247,000 | 3,698,556 | 1,819,618 | 161,940 | 5,927,114 |
| 1910 | 4,894,500 | 2,553,427 | 1,209,119 | 113,158 | 8,770,204 |
| 1911 | 25,000 | 3,745,349 | 1,632,402 | 259,564 | 5,663,115 |
| 1912 | 765,000 | 4,243,308 | 1,750,351 | 268,503 | 7,027,162 |
| 1913 | 2,617,100 | 5,867,179 | 2,336,509 | 205,742 | 11,026,530 |
| 1914 | 308,385 | 4,716,226 | 1,784,900 | 123,043 | 6,932,554 |
| 1915 | — | 1,170,606 | 472,597 | 49,548 | 1,692,661 |
| 1916 | 20,000 | 754,372 | 481,703 | 34,510 | 1,290,585 |
| 1917 | — | 706,084 | 347,354 | 33.869 | 1,087,307 |
| 1918 | — | 778,525 | 229,292 | 39,517 | 1,047,334 |
| 1919 | — | 1,703,961 | 505,652 | 118,718 | 2,328,331 |
| 1920 | — | 26,280,243 | | 295,771 | 26,576,016 |
| 1921 | — | 29,523,833 | | 470,615 | 29,994,448 |
| 1922 | — | 30,222,080 | | 220,435 | 30,442,515 |
| 1923 | — | 9,566,187 | | 148,474 | 9,714,661 |
| 1924 (to July) | — | 1,620,783 | | 92,563 | 1,713,346 |

## STATEMENT SHOWING THE VALUE OF THE IMPORTS FOR HOME CONSUMPTION AND EXPORTS OF DOMESTIC PRODUCE OF THE PRINCIPAL COUNTRIES FOR THE YEARS 1913, 1922, AND 1923.

(Foreign currencies converted to sterling at par.)

| Countries. | Imports. | | | Exports. | | |
|---|---|---|---|---|---|---|
| | 1913. | 1922. | 1923. | 1913. | 1922. | 1923. |
| | Thousand £. | Thousand £. | Thousand £. | Thousand £ | Thousand £. | Thousand £. |
| United Kingdom | 652,692 | 1,003.918 | 1,098,016 | 524,532 | 720,496 | 767,329 |
| United States | 366,012 | 703.083 | 766,345 | 510,060 | 850,506 | 840,678 |
| France | 336,852 | 947.661 | 1,292,943 | 275,208 | 818,477 | 1,206,642 |
| Netherlands | 325,236 | 167,347 | 165,956 | 255,456 | 100,845 | 107,642 |
| Belgium | 185,460 | 359,917 | 497,636 | 145.380 | 240.269 | 351,169 |
| Italy | 145,824 | 623,582 | 682,991 | 100,464 | 368.641 | 438,496 |
| Canada | 135,648 | 172,124 | 185,663 | 89,664 | 180,510 | 208,513 |
| British India | 122,220 | 226,388 | 222,211 | 160,836 | 279.240 | 328,730 |
| Switzerland | 74,376 | 75,932 | 88,940 | 54,864 | 67,010 | 69,794 |
| Japan | 74,076 | 193,172 | 203,509 | 64,260 | 167,087 | 148,274 |
| Brazil | 67,164 | 110,175 | 151,362 | 65,448 | 155,472 | 219,802 |
| Spain | 52 248 | 120,416 | 121,306 | 42,300 | 57,625 | 63,264 |
| Denmark | 43,188 | 82,920 | 104,094 | 35,412 | 64,628 | 84,403 |
| Union of South Africa | 40,380 | 47,228 | 55,008 | 27,528 | 57,026 | 75,516 |
| New Zealand | 21,420 | 35,013 | 42,900 | 21,048 | 42,726 | 44,616 |

## STATEMENT SHOWING THE ENTRANCES AND CLEARANCES IN THE FOREIGN TRADE OF THE UNDERMENTIONED COUNTRIES FOR THE YEARS 1913, 1922, AND 1923.

Note.—C = With Cargo only. C & B = With Cargo and in Ballast.

| Countries. | | Entrances. | | | Clearances. | | |
|---|---|---|---|---|---|---|---|
| | | 1913. | 1922. | 1923. | 1913. | 1922. | 1923. |
| | | Thousand tons net. | Thousand tons net. | Thousand tons net. | Thousand tons net. | Thousand tons net. | Thousand tons net. |
| United Kingdom | C | 49,068 | 43,326 | 51,084 | 67,824 | 59,680 | 70,668 |
| United States of America | C & B | 53,280 | 65,196 | 66,252 | 53,796 | 64,836 | 66,624 |
| France | C | 34,512 | 44,315 | 41,760 | 26,112 | 44,335 | 30,624 |
| Japan | C & B | 24,720 | 35,795 | * | 24,900 | 35,557 | * |
| Netherlands | C | 17,148 | 15,972 | 16,272 | 11,016 | 10,464 | 11,532 |
| Spain | C & B | 25,788 | 20,304 | * | 28,992 | 17,496 | * |
| British India | C | 6,700 | 6,780 | 6,576 | 8,256 | 7,320 | 7,788 |
| Australia | C & B | 5,364 | 4,752 | 4,848 | 5,232 | 4,632 | 4,896 |
| South Africa | C & B | 5,352 | 4,488 | 5,136 | 5,280 | 4,416 | 5,004 |
| Norway | C | 3,756 | 2,892 | 3,192 | 4,740 | 3,300 | 4,092 |
| Belgium | C | 16,908 | 17,172 | 20,448 | 16,896 | 17,256 | 20,304 |
| Sweden | C & B | 13,764 | 10,572 | 12,192 | 17,004 | 10,752 | 12,240 |
| Brazil | C & B | 29,172 | 22,380 | 30,240 | 29,208 | 22,392 | * |

ABOVE AS PERCENTAGES OF 1913 FIGURES.

| | | | | | | |
|---|---|---|---|---|---|---|
| United Kingdom | 100 | 88 | 104 | 100 | 88 | 104 |
| United States of America | 100 | 122 | 127 | 100 | 104 | 124 |
| France | 100 | 129 | 121 | 100 | 170 | 117 |
| Japan | 100 | 145 | * | 100 | 135 | * |
| Netherlands | 100 | 93 | 95 | 100 | 95 | 105 |
| Spain | 100 | 79 | * | 100 | 60 | * |
| British India | 100 | 101 | 98 | 100 | 89 | 94 |
| Australia | 100 | 89 | 90 | 100 | 89 | 94 |
| South Africa | 100 | 84 | 96 | 100 | 84 | 95 |
| Norway | 100 | 77 | 85 | 100 | 70 | 86 |
| Belgium | 100 | 102 | 121 | 100 | 102 | 120 |
| Sweden | 100 | 77 | 89 | 100 | 63 | 72 |
| Brazil | 100 | 77 | 104 | 100 | 77 | * |

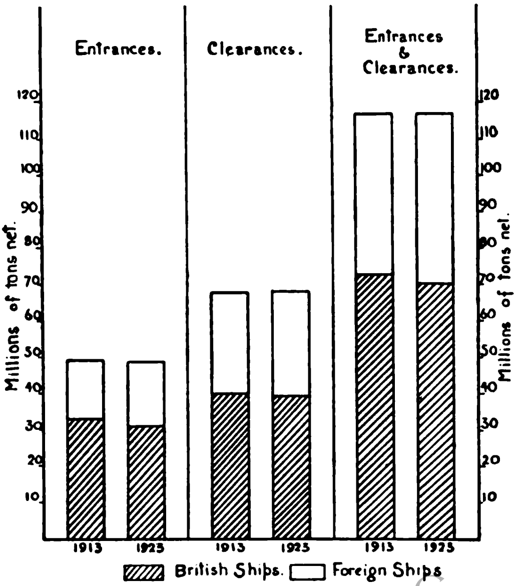
* Figures not available.

## STATEMENT SHOWING THE NATIONALITY AND NET TONNAGE OF VESSELS WHICH ENTERED AND CLEARED WITH CARGOES IN THE FOREIGN TRADE OF THE UNITED KINGDOM FOR THE YEARS 1913 AND 1923. (*See diagram below.*)

| Nationality. | Entrances. | | Clearances. | | Percentages | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Entrances. | | Clearances. | |
| | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. |
| | Tons.* | Tons.* | Tons.* | Tons.* | | | | |
| British | 32,291 | 30,952 | 40,102 | 39,394 | 65·8 | 63·3 | 59·1 | 58·0 |
| *Foreign* :— | | | | | | | | |
| Norwegian | 3,285 | 2,648 | 4,683 | 4,399 | 6·7 | 5·4 | 6·9 | 6·5 |
| United States of America | 724 | 2,847 | 370 | 1,314 | 1·5 | 5·8 | 0·5 | 1·9 |
| Swedish | 1,891 | 1,711 | 3,016 | 2,336 | 3·9 | 3·5 | 4·5 | 3·4 |
| Dutch | 1,702 | 2,385 | 2,536 | 3,938 | 3·5 | 4·9 | 3·7 | 5·8 |
| Danish | 1,161 | 1,329 | 2,613 | 2,564 | 2·4 | 2·7 | 3·9 | 3·8 |
| French | 999 | 1,444 | 1,975 | 4,027 | 2·0 | 3·0 | 2·9 | 5·9 |
| Belgian | 1,369 | 937 | 957 | 1,318 | 2·8 | 1·9 | 1·4 | 1·9 |
| Japanese | 140 | 448 | 282 | 519 | 0·3 | 0·9 | 0·4 | 0·8 |
| Spanish | 1,060 | 911 | 1,694 | 1,290 | 2·2 | 1·9 | 2·5 | 1·9 |
| Italian | 122 | 314 | 955 | 1,442 | 0·2 | 0·7 | 1·4 | 2·1 |
| Russian | 678 | — | 937 | — | 1·4 | — | 1·4 | — |
| Greek | 221 | 423 | 1,072 | 940 | 0·4 | 0·9 | 1·6 | 1·3 |
| German | 3,166 | 1735 | 5,730 | 3,266 | 6·4 | 3·5 | 8·5 | 4·8 |
| Austro-Hungarian | 128 | — | 715 | — | 0·3 | — | 1·0 | — |
| Other Nationalities | 125 | 821 | 185 | 1173 | 0·2 | 1·6 | 0·3 | 1·9 |
| Total Foreign | 16,772 | 17,983 | 27,719 | 28,526 | 34·2 | 36·7 | 40·9 | 42·0 |
| Total British and Foreign | 49,063 | 48,935 | 67,821 | 67,920 | 100·0 | 100·0 | 100·0 | 1·000 |

| | Entrances and Clearances. | | Percentages. | |
|---|---|---|---|---|
| | 1913. | 1923. | 1913. | 1923. |
| | Tons.* | Tons.* | | |
| British | 72,393 | 70,346 | 62 | 60 |
| Foreign | 44,490 | 46,509 | 38 | 40 |
| Total | 116,883 | 116,855 | 100 | 100 |

* *Figures in thousands*, i.e. *hundreds omitted.*

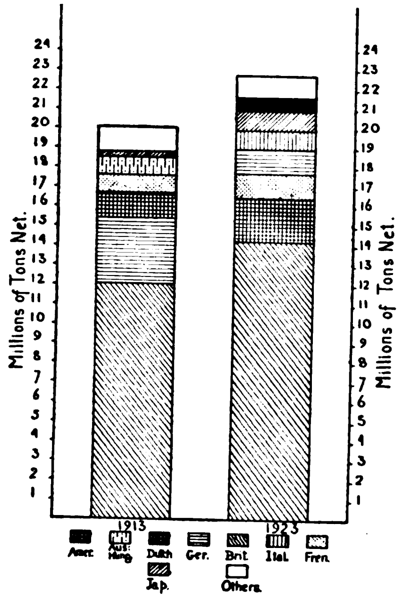


STATEMENT SHOWING THE NUMBER AND NET TONNAGE OF VESSELS THAT PASSED THROUGH THE SUEZ CANAL IN THE YEARS 1913 AND 1923, DISTINGUISHING THE PRINCIPAL NATIONALITIES.

| Nationality of Vessels. | Number of Passages. | | Net Tonnage of Vessels. | | Numbers as Percentages of Total. | | Tonnages as Percentages of Total. | |
|---|---|---|---|---|---|---|---|---|
| | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. |
| British . . . . | 2951 | 2839 | 12,052,484 | 14,264,214 | 58·0 | 61·5 | 60·2 | 62·8 |
| Japanese . . . | 68 | 172 | 343,732 | 986,283 | 1·3 | 3·7 | 1·7 | 4·4 |
| Dutch . . . . | 342 | 451 | 1,287,354 | 2,178,058 | 6·7 | 9·8 | 6·4 | 9·6 |
| French . . . . | 256 | 259 | 927,787 | 1,294,400 | 5·0 | 5·6 | 4·6 | 5·7 |
| Italian . . . . | 110 | 256 | 290,576 | 1,042,754 | 2·2 | 5·6 | 1·5 | 4·6 |
| Danish . . . . | 56 | 64 | 171,848 | 299,695 | 1·1 | 1·4 | 0·9 | 1·3 |
| Norwegian . . . | 44 | 87 | 93,313 | 335,597 | 0·9 | 1·9 | 0·5 | 1·5 |
| American (U.S.) . | 8 | 114 | 7,476 | 614,128 | 0·2 | 2·5 | — | 2·7 |
| Swedish . . . | 33 | 60 | 122,957 | 275,264 | 0·7 | 1·3 | 0·6 | 1·2 |
| Greek . . . . | 17 | 20 | 54,560 | 61,031 | 0·3 | 0·4 | 0·3 | 0·3 |
| Spanish . . . | 26 | 13 | 75,643 | 36,718 | 0·5 | 0·3 | 0·4 | 0·2 |
| German . . . | 778 | 247 | 3,352,287 | 1,213,691 | 15·3 | 5·4 | 16·7 | 5·4 |
| Austria-Hungarian | 246 | — | 845,830 | — | 4·8 | — | 4·2 | — |
| Russian . . . | 110 | 23 | 340,595 | 73,896 | 2 2 | 0·5 | 1·7 | 0·3 |
| All others . . . | 40 | 16 | 67,422 | 54,433 | 0·8 | 0·1 | 0·3 | 0·0 |
| Total . . | 5085 | 4621 | 20,033,802 | 22,730,162 | 100·0 | 100·0 | 100·0 | 100·0 |

NOTE.—The above figures include not only Merchant Vessels and Mail Steamers, but also Warships and Transports as well as Government Chartered Vessels.

NET TONNAGE AND NATIONALITIES OF VESSELS PASSED THROUGH THE SUEZ CANAL, 1913 AND 1923.



STATEMENT SHOWING THE NUMBER AND NET TONNAGE OF COMMERCIAL VESSELS THAT PASSED THROUGH THE PANAMA CANAL IN THE YEARS ENDED 30TH JUNE, 1918, 1919, 1920, 1921, 1922, 1923, AND 1924, DISTINGUISHING THE PRINCIPAL NATIONALITIES.

NOTE.—Commercial Vessels include all Vessels except those of the United States Government, or chartered by the U.S. Government to carry Government supplies, and Vessels of less than 10 tons measurement).

| Nationality. | Number of Vessels. | | | | | | | Net Tonnage of Vessels. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1918. | 1919. | 1920. | 1921. | 1922. | 1923. | 1924. | 1918. | 1919. | 1920. | 1921. | 1922. | 1923. | 1924. |
| British . . . . | 702 | 607 | 753 | 972 | 935 | 1,065 | 1,265 | 2,529,203 | 1,915,744 | 2,760,188 | 3,978,320 | 3,795,526 | 4,892,338 | 6,097,611 |
| American (U.S.A.)* | 567 | 784 | 1,129 | 1,210 | 1095 | 1,994 | 2,947 | 1,704,040 | 2,257,342 | 3,791,088 | 4,861,761 | 4,971,509 | 10,208,536 | 15,806,899 |
| Norwegian . . . | 296 | 128 | 106 | 140 | 113 | 147 | 136 | 876,024 | 497,555 | 397,632 | 548,227 | 385,007 | 597,359 | 546,633 |
| Japanese . . . . | 54 | 87 | 118 | 136 | 189 | 163 | 171 | 238,814 | 341,064 | 515,243 | 613,245 | 872,466 | 753,219 | 815,468 |
| Chilian . . . . | 96 | 93 | 79 | 63 | 53 | 62 | 47 | 254,841 | 253,561 | 212,000 | 159,727 | 150,398 | 201,411 | 176,472 |
| Danish . . . . | 100 | 79 | 9 | 60 | 53 | 65 | 65 | 272,946 | 213,534 | 32,221 | 236,512 | 227,473 | 240,053 | 245,929 |
| Peruvian . . . . | 83 | 64 | 75 | 60 | 60 | 80 | 70 | 208,958 | 166,956 | 191,689 | 157,495 | 161,930 | 216,829 | 189,046 |
| Dutch . . . . | 48 | 19 | 29 | 50 | 66 | 109 | 102 | 197,627 | 88,299 | 152,535 | 248,801 | 293,428 | 510,970 | 551,761 |
| French . . . . | 52 | 104 | 60 | 44 | 51 | 56 | 83 | 147,805 | 253,774 | 114,664 | 155,889 | 190,171 | 252,333 | 386,640 |
| Spanish . . . . | 11 | 5 | 41 | 44 | 9 | 14 | 45 | 24,469 | 11,066 | 106,651 | 117,400 | 27,264 | 41,201 | 172,572 |
| Other Nationalities | 60 | 54 | 79 | 113 | 112 | 212 | 299 | 119,346 | 126,095 | 272,133 | 338,490 | 342,287 | 691,537 | 1,159,847 |
| Totals . . . | 2,069 | 2,024 | 2,478 | 2,892 | 2,736 | 3,967 | 5,230 | 6,574,073 | 6,124,990 | 8,546,044 | 11,415,876 | 11,417,459 | 18,605,786 | 26,148,878 |

ABOVE AS PERCENTAGES.

| | 1918. | 1919. | 1920. | 1921. | 1922. | 1923. | 1924. | 1918. | 1919. | 1920. | 1921. | 1922. | 1923. | 1924. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| British . . . . . | 33·9 | 30·0 | 30·4 | 33·6 | 34·2 | 26·8 | 24·2 | 38·5 | 31·3 | 32·3 | 34·8 | 33·3 | 26·3 | 23·3 |
| American (U.S.A.)* | 27·4 | 38·7 | 45·6 | 41·8 | 40·0 | 50·3 | 56·3 | 25·9 | 36·8 | 44·4 | 42·6 | 43·5 | 54·9 | 60·5 |
| Norwegian . . . | 14·3 | 6·3 | 4·3 | 4·9 | 4·1 | 3·7 | 2·6 | 13·3 | 8·1 | 4·7 | 4·8 | 3·4 | 3·2 | 2·1 |
| Japanese . . . | 2·6 | 4·3 | 4·8 | 4·7 | 6·9 | 4·1 | 3·3 | 3·6 | 5·6 | 6·0 | 5·4 | 7·6 | 4·0 | 3·1 |
| Chilian . . . . | 4·7 | 4·6 | 3·2 | 2·2 | 2·0 | 1·6 | 0·8 | 3·9 | 4·1 | 2·5 | 1·4 | 1·3 | 1·1 | 0·7 |
| Danish . . . | 4·8 | 3·9 | 0·3 | 2·1 | 2·0 | 1·6 | 1·2 | 4·2 | 3·5 | 0·4 | 2·1 | 2·0 | 1·3 | 0·9 |
| Peruvian . . . . | 4·0 | 3·2 | 3·0 | 2·1 | 2·2 | 2·0 | 1·3 | 3·2 | 2·7 | 2·2 | 1·4 | 1·4 | 1·2 | 0·7 |
| Dutch . . . . | 2·3 | 0·9 | 1·2 | 1·7 | 2·4 | 2·7 | 2·0 | 3·0 | 1·4 | 1·8 | 2·2 | 2·6 | 2·7 | 2·1 |
| French . . . . | 2·5 | 5·1 | 2·4 | 1·5 | 1·8 | 1·4 | 1·6 | 2·2 | 4·2 | 1·3 | 1·4 | 1·7 | 1·4 | 1·5 |
| Spanish . . . . | 0·6 | 0·3 | 1·6 | 1·5 | 0·3 | 0·3 | 0·9 | 0·4 | 0·2 | 1·2 | 1·0 | 0·2 | 0·2 | 0·7 |
| Other Nationalities | 2·9 | 2·7 | 3·2 | 3·9 | 4·1 | 5·5 | 5·8 | 1·8 | 2·1 | 3·2 | 2·9 | 3·0 | 3·7 | 4·4 |
| Totals . . . | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 |

* Includes Vessels engaged in the coasting trade of the U.S.A., which is carried on *entirely* by National Ships.

STATEMENT SHOWING (IN TONS WEIGHT) THE CARGOES CARRIED IN COMMERCIAL VESSELS THAT PASSED THROUGH THE PANAMA CANAL DURING THE YEARS ENDED 30TH JUNE, 1918, 1919, 1920, 1921, 1922, 1923, AND 1924, DISTINGUISHING THE PRINCIPAL NATIONALITIES.

| Nationality of Vessels. | Weight of Cargoes carried. | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1918. | 1919. | 1920. | 1921. | 1922. | 1923. | 1924. |
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. |
| British . . . . | 2,615,675 | 1,876,939 | 2,830,268 | 3,738,257 | 3,329,861 | 4,929,317 | 6,051,842 |
| American (U.S.A.) | 2,098,277 | 2,758,886 | 4,547,140 | 5,163,025 | 4,950,519 | 11,055,150 | 16,654,435 |
| Norwegian . . . | 1,090,823 | 577,679 | 404,323 | 637,887 | 408,268 | 704,292 | 539,101 |
| Japanese . . . | 407,399 | 503,427 | 726,338 | 758,617 | 1,044,515 | 943,400 | 935,245 |
| Chilian . . . . | 153,259 | 161,340 | 104,738 | 61,737 | 46,182 | 76,670 | 107,147 |
| Danish . . . . | 420,063 | 325,277 | 42,533 | 322,059 | 272,779 | 307,876 | 317,274 |
| Peruvian . . . | 143,344 | 121,524 | 119,418 | 105,322 | 64,370 | 111,519 | 102,136 |
| Dutch . . . . | 233,063 | 119,297 | 128,442 | 216,488 | 290,573 | 487,957 | 573,929 |
| French . . . . | 159,859 | 286,812 | 125,249 | 132,836 | 139,463 | 230,175 | 407,249 |
| Spanish . . . . | 35,394 | 10,047 | 101,563 | 143,076 | 23,701 | 32,178 | 67,903 |
| Other Nationalities | 174,875 | 175,393 | 244,487 | 319,910 | 314,679 | 689,341 | 1,238,449 |
| Totals . . . | 7,532,031 | 6,916,621 | 9,374,499 | 11,599,214 | 10,884,910 | 19,567,875 | 26,994,710 |

ABOVE AS PERCENTAGES.

| | 1918. | 1919. | 1920. | 1921. | 1922. | 1923. | 1924. |
|---|---|---|---|---|---|---|---|
| British . . . . | 34·7 | 27·1 | 30·2 | 32·2 | 30·6 | 25·2 | 22·4 |
| American (U.S.A.) | 27·9 | 39·9 | 48·5 | 44·5 | 45·5 | 56·5 | 61·7 |
| Norwegian . . . | 14·5 | 8·4 | 4·3 | 5·5 | 3·7 | 3·6 | 2·0 |
| Japanese . . . | 5·4 | 7·3 | 7·7 | 6·5 | 9·6 | 4·8 | 3·5 |
| Chilian . . . . | 2·0 | 2·3 | 1·1 | 0·5 | 0·4 | 0·4 | 0·4 |
| Danish . . . . | 5·6 | 4·7 | 0·5 | 2·8 | 2·5 | 1·6 | 1·2 |
| Peruvian . . . | 1·9 | 1·8 | 1·3 | 0·9 | 0·6 | 0·6 | 0·4 |
| Dutch . . . . | 3·1 | 1·7 | 1·4 | 1·9 | 2·7 | 2·5 | 2·1 |
| French . . . | 2·1 | 4·2 | 1·3 | 1·2 | 1·3 | 1·2 | 1·5 |
| Spanish . . . . | 0·5 | 0·1 | 1·1 | 1·2 | 0·2 | 0·2 | 0·3 |
| Other Nationalities | 2·3 | 2·5 | 2·6 | 2·8 | 2·9 | 3·4 | 4·5 |
| Totals . . . | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 |

## COAL PRODUCTION AND DISTRIBUTION OF THE UNITED KINGDOM. (*See diagrams on page* 564.)

| Year. | Total production. (Thousand tons.) | Home consumption. (Thousand tons.) | Exported * (Thousand tons.) | Bunkers. (Foreign trade.) (Thousand tons.) |
|---|---|---|---|---|
| 1902 | 227,095 | 168,788 | 43,159 | 15,148 |
| 1903 | 230,334 | 168,584 | 44,950 | 16,800 |
| 1904 | 232,428 | 168,981 | 46,256 | 17,191 |
| 1905 | 236,129 | 171,256 | 47,477 | 17,396 |
| 1906 | 251,068 | 176,878 | 55,600 | 18,590 |
| 1907 | 267,831 | 185,602 | 63,610 | 18,619 |
| 1908 | 261,529 | 179,508 | 62,547 | 19,474 |
| 1909 | 263,774 | 180,983 | 63,077 | 19,714 |
| 1910 | 264,433 | 182,822 | 62,085 | 19,526 |
| 1911 | 271,892 | 188,029 | 64,599 | 19,264 |
| 1912 | 260,416 | 177,681 | 64,444 | 18,291 |
| 1913 | 287,412 | 192,980 | 73,400 | 21,032 |
| 1914 | 265,430 | 187,854 | 59,040 | 18,536 |
| 1915 | 253,179 | 196,013 | 43,535 | 13,631 |
| 1916 | 255,846 | 204,506 | 38,352 | 12,988 |
| 1917 | 248,041 | 202,817 | 34,996 | 10,228 |
| 1918 | 226,557 | 186,048 | 31,753 | 8,756 |
| 1919 | 229,037 | 181,766 | 35,250 | 12,021 |
| 1920 | 229,295 | 190,523 | 24,932 | 13,840 |
| 1921 | 164,344 | 128,757 | 24,661 | 10,926 |
| 1922 | 250,808 | 168,350 | 64,198 | 18,259 |
| 1923 | 278,141 | 180,533 | 79,450 | 18,158 |

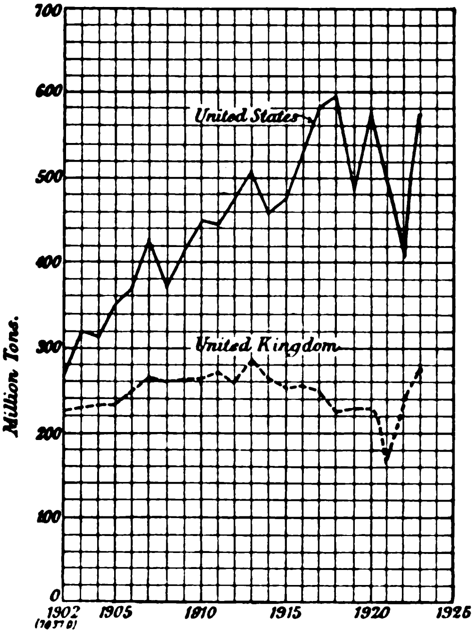
* Excluding coke and manufactured fuel.

## COAL PRODUCTION AND DISTRIBUTION OF THE UNITED STATES. (*See diagrams on page* 564.)

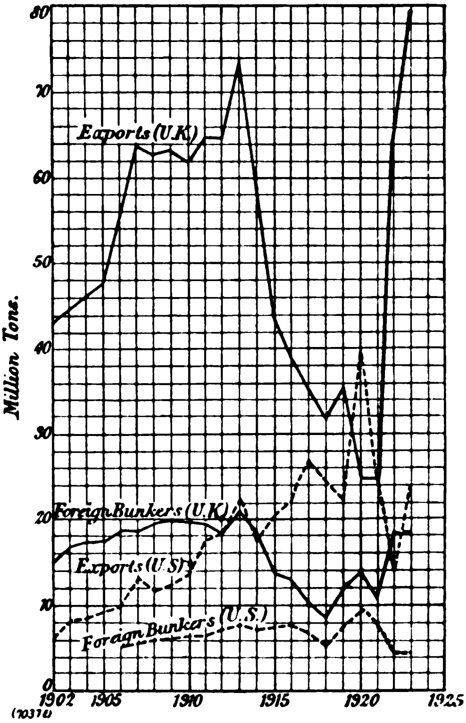
| Year. | Total production.* (Thousand tons.) | Home consumption. (Thousand tons.) | Exported. (Thousand tons.) | Bunkers. (Foreign trade.) (Thousand tons.) |
|---|---|---|---|---|
| 1902 | 269,278 | Figures not available | 6,127 | Figures not available |
| 1903 | 321,067 | ,, | 8,312 | ,, |
| 1904 | 314,122 | ,, | 8,573 | ,, |
| 1905 | 350,645 | ,, | 9,189 | ,, |
| 1906 | 369,783 | 354,736 | 9,922 | 5,125 |
| 1907 | 428,895 | 409,988 | 13,153 | 5,754 |
| 1908 | 370,838 | 352,961 | 11,853 | 6,024 |
| 1909 | 411,469 | 392,813 | 12,537 | 6,119 |
| 1910 | 449,283 | 429,031 | 13,806 | 6,446 |
| 1911 | 443,188 | 419,088 | 17,433 | 6,667 |
| 1912 | 477,202 | 451,713 | 18,149 | 7,340 |
| 1913 | 508,893 | 479,051 | 22,141 | 7,701 |
| 1914 | 458,505 | 433,607 | 17,632 | 7,266 |
| 1915 | 474,660 | 446,884 | 20,305 | 7,471 |
| 1916 | 526,874 | 495,905 | 23,143 | 7,826 |
| 1917 | 581,610 | 548,078 | 26,649 | 6,883 |
| 1918 | 595,546 | 565,622 | 24,392 | 5,532 |
| 1919 | 487,639 | 457,847 | 22,449 | 7,343 |
| 1920 | 576,485 | 527,908 | 39,215 | 9,362 |
| 1921 | 494,915 | 462,539 | 24,829 | 7,547 |
| 1922 | 411,000 | 393,436 | 13,448 | 4,116 |
| 1923 | 572,502 | 544,255 | 23,700 | 4,547 |

* Figures given include both anthracite and bituminous coal.

PRODUCTION OF COAL IN THE UNITED KINGDOM & THE UNITED STATES.



EXPORTS OF COAL FROM THE UNITED KINGDOM & THE UNITED STATES, ALSO QUANTITIES SUPPLIED FOR BUNKERING VESSELS IN FOREIGN TRADE.



PRICES OF BRITISH BUNKER COALS, 1914 TO 1924.

| Class of Coal. | Average prices 1914. | | Highest and Lowest Prices. | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1915 | | 1916 | | 1917 | | 1918 | | 1919 | | 1920 | | 1921 | | 1922. | | 1923 | | 1924 (to Aug.) | |
| | s | d. | s. | d. | s. | d. | s, | d. | s. | d. | s. | d. | s. | d. | s. | d. | s. | d. | s. | d. | s. | d. |
| Durham Bunkers—(Tyne special) . | 12 | 8½ | 30 | 0 | 42 | 6 | 26 | 6 | 75 | 0 | 100 | 0 | 120 | 0 | 60 | 0 | 25 | 0 | 37 | 6 | 30 | 0 |
| | | | 12 | 6 | 22 | 6 | 20 | 0 | 25 | 0 | 32 | 0 | 33 | 6 | 26 | 0 | 19 | 6 | 23 | 0 | 20 | 6 |
| Durham Bunkers—(Tyne ordinary) . | 12 | 0½ | 25 | 0 | 39 | 0 | 24 | 0 | 65 | 0 | 90 | 0 | 115 | 0 | 52 | 0 | 23 | 0 | 33 | 0 | 28 | 0 |
| | | | 10 | 3 | 18 | 0 | 16 | 0 | 24 | 0 | 31 | 0 | 32 | 0 | 24 | 0 | 19 | 0 | 20 | 0 | 18 | 6 |
| Cardiff Bunkers—Small (class 1) . | 9 | 6 | 23 | 6 | 34 | 0 | 21 | 6 | 28 | 6 | 85 | 0 | 97 | 6 | 55 | 0 | 23 | 0 | 33 | 0 | 23 | 0 |
| | | | 10 | 0 | 14 | 6 | 13 | 0 | 21 | 6 | 28 | 6 | 35 | 0 | 18 | 6 | 16 | 0 | 17 | 0 | 16 | 0 |
| Cardiff Bunkers—No. 2 through . | 13 | 0 | 24 | 0 | 40 | 0 | 25 | 0 | 35 | 6 | 80 | 0 | 110 | 0 | 50 | 0 | 24 | 0 | 35 | 0 | 24 | 0 |
| | | | 12 | 0 | 15 | 6 | 16 | 6 | 23 | 6 | 35 | 6 | 50 | 0 | 20 | 0 | 18 | 0 | 18 | 0 | 19 | 0 |
| South Derbyshire—Steam hard . . | — | | 26 | 3 | 42 | 6 | 35 | 0 | 70 | 0 | 70 | 0 | 80 | 0 | 53 | 0 | 28 | 0 | 33 | 6 | 32 | 6 |
| | | | 14 | 9 | 20 | 6 | 24 | 0 | 30 | 0 | 37 | 0 | 37 | 0 | 26 | 0 | 23 | 6 | 24 | 0 | 23 | 6 |
| Yorkshire nuts—Doubles . . . | 12 | 7½ | 21 | 0 | 28 | 0 | 27 | 6 | 60 | 0 | 60 | 0 | 80 | 0 | 50 | 0 | 30 | 0 | 33 | 0 | 30 | 0 |
| | | | 14 | 6 | 21 | 0 | 24 | 0 | 25 | 0 | 32 | 0 | 32 | 0 | 27 | 0 | 22 | 0 | 25 | 0 | 21 | 6 |
| Scotch Navigation—f.o.b. Glasgow . | 16 | 1½ | 26 | 0 | 40 | 0 | 32 | 6 | 70 | 0 | 95 | 0 | 97 | 6 | 75 | 0 | 28 | 6 | 32 | 0 | 30 | 0 |
| | | | 13 | 9 | 24 | 0 | 26 | 0 | 30 | 0 | 37 | 0 | 72 | 6 | 26 | 0 | 25 | 0 | 24 | 6 | 23 | 6 |
| Scotch Navigation—f.o.b. Fife Ports . | 13 | 3 | 30 | 0 | 50 | 0 | 33 | 6 | 70 | 0 | 110 | 0 | 142 | 0 | 60 | 0 | 30 | 0 | 35 | 0 | 32 | 0 |
| | | | 16 | 6 | 23 | 0 | 27 | 0 | 31 | 0 | 38 | 0 | 73 | 0 | 28 | 0 | 26 | 0 | 27 | 6 | 26 | 0 |
| Best Lancashire—Steam . . . . | — | | — | | 26 | 0 | 27 | 6 | 65 | 0 | 47 | 6 | 50 | 0 | 47 | 6 | 26 | 6 | 28 | 0 | 31 | 6 |
| | | | | | 21 | 6 | 23 | 0 | 27 | 6 | 34 | 6 | 37 | 6 | 24 | 0 | 20 | 0 | 20 | 0 | 18 | 6 |

## STATEMENT SHOWING THE NATIONALITY AND NET TONNAGE OF VESSELS WHICH ENTERED AND CLEARED WITH CARGOES AND IN BALLAST IN THE FOREIGN TRADE OF THE UNITED STATES OF AMERICA FOR THE YEARS ENDED 30TH JUNE, 1913, AND 31ST DECEMBER, 1922. (*See diagram* A, *page* 566.)

| Nationality. | Entrances. | | Clearances. | | Percentages. | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Entrances. | | Clearances. | |
| | 1913. | 1922. | 1913. | 1922. | 1913. | 1922. | 1913. | 1922. |
| | Tons.* | Tons.* | Tons.* | Tons.* | | | | |
| American . . . . | 13,073 | 31,738 | 13,946 | 31,759 | 25·8 | 48·7 | 27·3 | 49·0 |
| British . . . . . | 24,532 | 21,432 | 24,289 | 21,063 | 48·5 | 32·9 | 47·5 | 32·5 |
| *Other Nationalities*:— | | | | | | | | |
| Austrian . . . . | 438 | — | 424 | — | 0·9 | — | 0·8 | — |
| Belgian . . . . | 352 | 284 | 356 | 310 | 0·7 | 0·4 | 0·7 | 0·5 |
| Danish . . . . | 481 | 918 | 446 | 846 | 0·9 | 1·4 | 0·9 | 1·3 |
| Dutch . . . . | 1,049 | 1,234 | 1,077 | 1,241 | 2·1 | 1·9 | 2·1 | 1·9 |
| French . . . . | 1,027 | 1,485 | 1,034 | 1,464 | 2·0 | 2·3 | 2·0 | 2·3 |
| German . . . . | 4,578 | 482 | 4,587 | 469 | 9·0 | 0·7 | 9·0 | 0·7 |
| Italian . . . . | 838 | 1,014 | 802 | 1,053 | 1·7 | 1·6 | 1·6 | 1·6 |
| Norwegian . . | 2,774 | 2,648 | 2,798 | 2,510 | 5·5 | 4·1 | 5·5 | 3·9 |
| Portuguese . . . | 14 | 5 | 15 | 4 | — | — | — | — |
| Russian . . . . | 130 | — | 130 | — | 0·2 | — | 0·2 | — |
| Spanish . . . . | 391 | 447 | 374 | 459 | 0·8 | 0·7 | 0·7 | 0·7 |
| Swedish . . . . | 60 | 453 | 65 | 426 | 0·1 | 0·7 | 0·1 | 0·7 |
| Japanese . . . | 394 | 1,947 | 287 | 2,097 | 0·8 | 3·0 | 0·6 | 3·2 |
| All other Nationalities . . . . | 510 | 1,104 | 523 | 1,138 | 1·0 | 1·6 | 1·0 | 1·5 |
| Total . . . | 50.639* | 65,191* | 51,152* | 64,839* | 100·0 | 100·0 | 100·0 | 100·0 |

| | Entrances and Clearances. | | | Percentage of Total | | Percentage. Increase or Decrease. |
|---|---|---|---|---|---|---|
| | 1913. | 1922. | Difference. | 1913. | 1922. | |
| | Tons.* | Tons.* | Tons.* | | | |
| American . . . | 27,018 | 63,497 | Increase 36,479 | 27 | 49 | Increase 135 |
| British . . . . | 48,821 | 42,495 | Decrease 6,326 | 48 | 33 | Decrease 13 |
| Other Nationalities | 25.952 | 24,038 | Decrease 1,914 | 25 | 18 | Decrease 7 |
| Total . . . | 101,791* | 130,030* | Increase 28,239* | 100 | 100 | Increase 28 |

* *Figures in thousands*, i.e. *hundreds omitted.*

## PROPORTION OF U.S.A. EXPORTS CARRIED IN BRITISH, AMERICAN, AND OTHER VESSELS, AS SHOWN BY THE CLEARANCES WITH CARGOES IN THE OVERSEAS TRADE OF THE UNITED STATES OF AMERICA. (*See diagram* B, *page* 566.)

| — | Clearances with Cargoes. | | | |
|---|---|---|---|---|
| | 1913. | Percentage 1913. | 1922. | Percentage 1922. |
| | Net Tons. | | Net Tons. | |
| British Vessels . . . . . . | 21.825,638 | 49 | 17,447,000 | 36 |
| American Vessels . . . . . | 10,917,760 | 25 | 20,454,000 | 42 |
| All other Vessels . . . . . | 11,739,449 | 26 | 10,547,000 | 22 |
| Total Clearances with Cargoes . | 44,482,847 | 100 | 48,478,000 | 100 |

## PERCENTAGE OF UNITED STATES IMPORTS AND EXPORTS CARRIED IN AMERICAN VESSELS.—(By Ten-Year Periods Generally.)

| Fiscal Year. | By Sea (including all Great Lakes water-borne foreign Commerce). | | | | By Land Vehicles. Value in Dollars. | Total by Land and Sea. Value in Dollars |
|---|---|---|---|---|---|---|
| | In American Vessels. Value in Dollars. | In Foreign Vessels. Value in Dollars. | Total. Value in Dollars. | Per cent. American Vessels. | | |
| 1821 | 113,210,462 | 14,358,235 | 127,559,679 | 88·7 | — | — |
| 1830 | 129,918,458 | 14,447,970 | 144,366,428 | 89·9 | — | — |
| 1840 | 198,424,609 | 40,802,856 | 239,227,465 | 82·9 | — | — |
| 1850 | 230,272,084 | 90,764,954 | 330,037,038 | 72·5 | — | — |
| 1860 | 507,247,757 | 255,040,793 | 762,288,550 | 66·5 | — | — |
| 1870 | 352,969,401 | 638,927,488 | 991,896,889 | 35·6 | — | 991,896,889 |
| 1880 | 258,346,577 | 1,244,265,433 | 1,482,612,011 | 17·4 | 20,981,393 | 1,503,593,404 |
| 1890 | 202,451,086 | 1,371,116,744 | 1,573,567,830 | 12·9 | 73,571,263 | 1,647,139,093 |
| 1900 | 195,084,192 | 1,894,444.424 | 2,089,528,616 | 9·3 | 154,895,650 | 2,224,424,266 |
| 1910 | 260,837,147 | 2,721,962,475 | 2,982,799,622 | 8·7 | 319,132,528 | 3,301,932,150 |
| 1913 | 381,032,496 | 3,392,028,429 | 3,773,060,925 | 10·1 | 505,831,459 | 4,278,892.384 |
| 1914 | 368,359,756 | 3,417,108,756 | 3,785,468,512 | 9·7 | 473,036,293 | 4,258,504,805 |
| 1915 | 571,931,912 | 2,420,693,563 | 3,992,625,475 | 14·3 | 450,133,605 | 4,442,759,080 |
| 1916 | 948,908,216 | 4,877,132,995 | 5,826,041,211 | 16·3 | 705,325,184 | 6,531,366,395 |
| 1917 | 1,452,086,468 | 6,367,408,665 | 7,819,495,133 | 18·6 | 1,129,908,446 | 8,949,403,579 |
| 1918 | 1,688,495,946 | 6,015,204,510 | 7,703,700,456 | 21·9 | 1,161,666,318 | 8,865,366,774 |
| 1919* | 3,823,763,693 | 6,679,895,162 | 10,503,658,855 | 36·4 | 1,321,132,067 | 11,824,790,922 |
| 1920* | 5,154,337,761 | 6,830,563,705 | 11,984,901,466 | 43·0 | 1,523,256,493 | 13,508,157,959 |
| 1921* | 2,166,796,204 | 3,908,315,192 | 6,075,111,396 | 35·7 | 919,036,703 | 6,994,148,099 |
| 1922* | 2,161,715,609 | 3,803,167,434 | 6,964,883,043 | 31·0 | 881,163,751 | 7,846,046,794 |
| 1923* | 2,398,218,424 | 4,452,363,924 | 6,950,582,348 | 34·5 | 1,001,656,437 | 7,952,238,785 |

* Up to and including 1918, the statistics given are for years ended on June 30; from 1919 onwards they are given for calendar years.

Diagram A.—Showing Entrances and Clearances with Cargoes and in Ballast of British, American, and other Vessels in the Foreign Overseas Trade of the United States, 1913 and 1922.

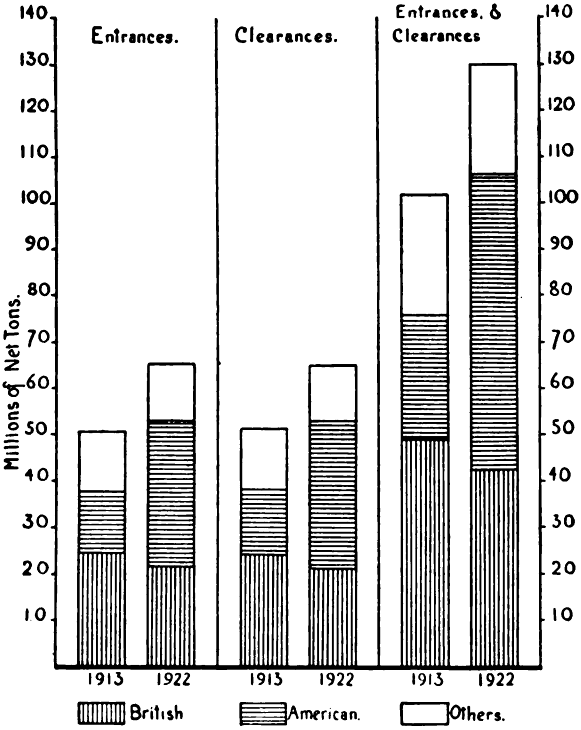
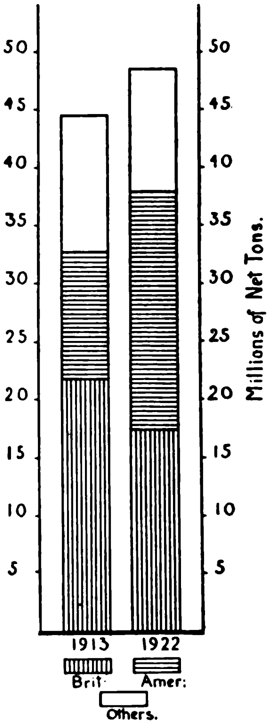


Diagram B.—Showing the Proportion of U.S. Seaborne Exports carried in British, American and other Vessels, 1913 and 1922



## FOREIGN TRADE OF THE UNITED STATES OF AMERICA

### 1913 AND 1923.

| — | Imports. | | Exports. | | Imports and Exports. | | Percentage of Total Imports. | | Percentage of Total Exports. | | Percentage of Total Imports and Exports. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1913. | 1923. | 1913. | 1923 | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. |
| Overland | Million $. 115.3 | Million $. 372.6 | Million $. 390.5 | Million $. 629.0 | Million $. 505.8 | Million $. 1001.6 | 6·4 | 10·1 | 15·8 | 15·1 | 11·8 | 12·8 |
| Oversea— | | | | | | | | | | | | |
| In American vessels | 193.1 | 1040.1 | 187.9 | 1358.2 | 381.0 | 2398.3 | 10·6 | 28·2 | 7·6 | 32·6 | 8·9 | 30·5 |
| In Foreign vessels | 1504.6 | 2271.6 | 1887.5 | 2180.8 | 3392.1 | 4452.4 | 83·0 | 61·7 | 76·6 | 52·3 | 79·3 | 56·7 |
| Total Oversea | 1697.7 | 3311.7 | 2075.4 | 3539.0 | 3773.1 | 6850.7 | 93·6 | 89·9 | 84·2 | 84·9 | 88·2 | 87·2 |
| Grand Total | 1813.0 | 3684·3 | 2465.9 | 4168.0 | 4278.9 | 7852.3 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 |

## FOREIGN TRADE OF THE UNITED STATES OF AMERICA.

STATEMENT SHOWING THE ENTRANCES AND CLEARANCES IN THE FOREIGN TRADE OF THE UNITED STATES OF AMERICA FOR THE YEARS 1913 AND 1923.

| Nationality of Vessels. | Entrances. | | Clearances. | | Entrances and Clearances. | | Percentages. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Entrances. | | Clearances. | | Entrances and Clearances. | |
| | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. | 1913. | 1923. |
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | | | | | | |
| American | 13,072,567 | 27,732,765 | 13,945,801 | 27,932,033 | 27,018,368 | 55,664,798 | 25·8 | 41·8 | 27·3 | 41·9 | 26·5 | 41·9 |
| Foreign | 37,566,606 | 38,593,622 | 37,206,158 | 38,691,681 | 74,772,764 | 77,285,303 | 74·2 | 58·2 | 72·7 | 58·1 | 73·5 | 58·1 |
| Total | 50,639,173 | 66,326,387 | 51,151,959 | 66,623,714 | 101,791,132 | 132,950,101 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 |

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Diesel Engine Users' Association: Secretaries, Percy Still and Geoffrey Porter: Address, 19, Cadogan Gardens, London, S.W. 3.

East of Scotland Association of Engineers and Ironfounders: Secretary, A. G. Muir: Address, 19, York Place, Edinburgh.

Electrical Engineers, Institution of: President, W. B. Woodhouse; Secretary, P. F. Rowell; Telephone, Gerrard 764; Telegrams, "Voltampere, Phone, London": Address, Savoy Place, Victoria Embankment, London, W.C. 2.

Engineers and Shipbuilders in Scotland, Institution of: President, J. Howden Hume; Secretary, E. H. Parker; Telephone, Central 5181; Telegrams, "Institution, Elmbank Crescent, Glasgow": Address, Elmbank Crescent, Glasgow.

Engineers (Inc.), Society of: President, A. Stewart Buckle: Hon. Treasurer and Hon. Secretary, C. T. Walrond; Secretary, A. S. E. Ackermann; Telephone, Victoria 244; Telegrams, "Windolite, Vic. London": Address, 17, Victoria Street, Westminster, London, S.W. 1.

Iron and Steel Institute: President, Sir William H. Ellis; Secretary, G. C. Lloyd; Telephone, Victoria 853; Telegrams, "Irosamente, Vic. London": Address, 28, Victoria Street, Westminster, London, S.W. 1.

Junior Institution of Engineers (Inc.): President, Sir J. Fortescue Flannery, Bart., M.Inst.C.E., M.I.Mar.E., M.I.N.A., M.I.Mech.E.; Chairman, C. O. Mourant, M.I.Struct.E.; Hon. Treasurer, C. H. Woodfield; Secretary, Herbert G. Riddle; Telephone, Victoria 6968; Telegrams, "Juniorinst, Sowest, London": Address, 39, Victoria Street, Westminster, London, S.W. 1.

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Nautical Research, Society for: President, Admiral of the Fleet, Sir F. C. Doveton Sturdee, Bart., G.C.B., K C.M.G., C.V.O., LL.D.; Hon. Secretary and Treasurer, Professor Geoffrey Callender, M.A., F.S.A., F.R.Hist.S.: Address, Royal Naval College, Greenwich, London, S.E. 10.

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Newcomen Society for the Study of the History of Engineering and Technology: Hon. Secretary, H. W. Dickinson: Address, The Science Museum, South Kensington, London, S.W. 7.

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North-East Coast Repairers' Association: Secretary, James Cameron: Address, Bolbec Hall, Newcastle-on-Tyne.

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# COLONIAL AND FOREIGN TECHNICAL SOCIETIES.

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Radio-Telegraphists' Institute of Australasia: President, W. G. Lawrence; General Secretary, S. Toombs: Address, 79–81, Pitt Street, Sydney, N.S.W.

## CANADA.

Canadian Engineering Standards Association: Secretary, R. J. Durley: Address, Room 112, West Block, Ottawa, Ontario.

Engineering Institute of Canada: Secretary, Fraser S. Keith: Address, 176, Mansfield Street, Montreal.

National Association of Marine Engineers of Canada: Secretary, Neil J. Morrison: Address, Box 886, St, John, N.B.

## FRANCE.

Association Technique Maritime: Address, Quai des Grands Augustins 55, Paris.

Bureau Veritas, International Register of Shipping: Address, 31, Rue d'Offémont, Paris.

## GERMANY.

Schiffbautechnische Gesellschaft: Address, Schumann Str. 2pt., Geschäftsstelle, Berlin N.W. 6.

## HOLLAND.

Koninklijk Institut van Ingenieur (Shipbuilding Section): Address, Prinsessegracht 23, The Hague.

## ITALY.

Collegio Degli Ingegneri Navali e Meccanici in Italia (College of Naval Architects and Marine Engineers): President, Commander Angelo Scribanti: Address, Palazzo Nuova Borsa log, Genoa.

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Japanese Society of Naval Architects: Honorary Secretary, Dr. H. Fujishima: Address (Temporary), c/o Engineering College, Imperial University, Tokyo.

Kikaigakkai (Society of Mechanical Engineers): President, Dr. Y. Shima: Address, c/o Tetsudo-Kyokai, Marunsuchi, Tokyo.

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American Association of Engineers: Secretary, C. E. Drayer: Address, 63, East Adams Street, Chicago, Ill.

American Institute of Electrical Engineers: President, H. J. Ryan; Secretary, F. L. Hutchinson: Address, 33, West 39th Street, New York, N.Y.

American Iron and Steel Institute: Secretary, H. H. Cook: Address, 40, Rector Street, New York City.

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American Society of Naval Engineers: Secretary, Commander S. M. Robinson, U.S.N. Address, Navy Department, Bureau of Engineering, Washington, D.C.

American Welding Society: Secretary, J. D. Connelly: Address, 1841, Oliver Building, Pittsburgh, Pa.

Association of Iron and Steel Electrical Engineers: Secretary, J. F. Kelly: Address, 1007, Empire Building, Pittsburg, Pa.

Boston Society of Civil Engineers: Secretary, J. B. Babcock: Address, 715, Tremont Temple, Boston, Mass.

Bureau of Construction and Repair: Address, Navy Department, Washington, D.C.

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Cleveland Engineering Society: Secretary, J. F. Oberlin: Address, 108, Hotel Winton, Cleveland, Ohio.

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Cornell Society of Civil Engineers: Secretary, R. W. Gastmeyer: Address, 58, Berwyn Avenue, Cornell E.O., N.J.

Engineering Foundation: Director, Alfred D. Flinn: Address, 29, Wést 39th Street, New York City.

Engineers' Club of Philadelphia: Secretary, C. E. Billin: Address, 1317, Bruce Street, Philadelphia, Pa.

Engineers' Society of Milwaukee: Secretary, F. H. Dorner: Address, 548, Milwaukee Street, Milwaukee.

Engineers' Society of Western Pennsylvania: Secretary, K. F. Treschow: Address, William Penn Hotel, Pittsburgh, Pa.

Federated American Engineering Societies: Secretary, L. W. Wallace: Address, 26, Jackson Place, Washington, D.C.

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Michigan Engineering Society: Secretary, C. B. Huff: Address, 6017, Grand River Avenue, Detroit, Michigan.

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National Association of Stationary Engineers: Secretary, F. W. Raven: Address, 417, S. Dearborn Street, Chicago, Ill.

Radio Engineers, Institute of; Secretary, A. N. Goldsmith: Address, College of the City of New York, 140th Street, New York City.

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Society for the Promotion of Engineering Education: Secretary, F. L. Bishop: Address, University of Pittsburgh, Pittsburgh, Pa.

United Engineering Society: Secretary, Alfred D. Flinn: Address, 29, West 39th Street, New York.

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Amalgamated Marine Workers' Union: Joint Secretaries, A. Cannon and J. McKinlay: Address, 41, Gower Street, London, W.C. 1.

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Belfast Shipowners' Association: Chairman, Sir George S. Clark Bt.; Hon. Secretary and Hon. Treasurer, J. A. M. Heyn; Telephones, Belfast 2097-99; Telegrams, "Heyn, Belfast": Address, Head Line Buildings, Victoria Street, Belfast.

Birkenhead Shipbuilding Employers' Association: Secretary, H. M. Hinchliffe: Address, Shipbuilding and Engineering Works, Birkenhead.

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Bristol Steamship Owners' Association: Chairman, A. S. Ray; Vice-Chairman, G. F. Cullen; Acting Hon. Secretary, W. G. McCann; Telephone, Bristol 1836: Address, 18, St. Augustine's Parade, Bristol.

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British Engineers' Association: Secretary, H. R. Summers : Address, 32, Victoria Street, London, S.W. 1.

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Empire Steamship Assurance Association, The: Managers, A. Bilbrough & Co., Ltd.: Address, 23, Rood Lane, London, E C. 3.

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Glasgow Salvage Association: Committee, J. Patrick Cuthbert (Chairman), D. C. Dawson (Deputy Chairman), R. G. Service, William McInnes, and T. R. Clark; Wreck Agent, Captain William Burns; Secretary and Treasurer, William Stewart; Telephone, Central 9520; Telegrams, "Underwriters. Gasgow": Address, Underwriters' Rooms, Royal Exchange Buildings, Glasgow.

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Liverpool Salvage Association: General Manager and Secretary, F. H. Lowe: Address, 19, 20 and 21, Exchange Buildings, Liverpool.

Liverpool Shipowners' Association: Chairman, Alex. Bicket, Junr.; Secretaries, Weightman, Pedder & Co.; Telegrams, "Weightman, Liverpool": Address, Barclay's Bank Building, Water Street, Liverpool.

Liverpool Shipping and Forwarding Agents' Association (Inc.): President, David Jones; Council, E. H. Eckes (Chairman), F. J. Adams, R. A. Barker, D. G. Evans, W. Esplen, J. H. Hughes, J. Mitchell-Jones, W. R. Lloyd, D. Maccabe, W. S. Johnson; Hon. Secretary, S. L. Jude; Telephone, Bank 8705; Telegrams, "Impartial, Liverpool": Address, 20, Redcross Street, Liverpool.

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London and District Employers' Association of Boiler Cleaners and Ship Scrapers: Secretary, C. A. Page: Address, 1, Lloyd's Avanue, London, E.C. 3.

London and District Welding Employers' Association: Secretary, C. A. Page: Address, 1, Lloyd's Avenue, London, E.C. 3.

London General Shipowners' Society: Chairman, Robert Corry; Secretary, Douglas T. Garrett; Telephone, Avenue 7084: Address, 1, Fenchurch Avenue, London, E.C. 3.

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London, Port of, Registration Committee: Secretary, I. le M. Crole: Address, 6, Minories, London, E. 1.

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London Underwriters, Institute of; Chairman, W. E. A. Williams: Vice-Chairman and Secretary, E. P. Hudson: Address, 1, St. Michael's House, Cornhill, London, E.C. 3.

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Monmouth Shipbuilders' Association: Secretary, W. C. Thomas: Address, Chepstow, Monmouth.

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National Maritime Board. *See* British Mercantile Marine.

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National Sailors' Society: Secretary, Rev. W. Burton, D.D.: Address, 10, Memorial Hall, Farringdon Street, London, E.C. 4.

Nautical Almanac Office, H.M.: Superintendent, P. H. Cowell, M.A., F.R.S.; Chief Assistant, B. F. Bawtree: Address, Royal Naval College, Greenwich; London. S.E. 10.

Nautical College, Pangbourne, Berkshire: Captain Superintendent, Commander A. F. G. Tracy, R.N. (retd.); Managers, Devitt and Moore's Ocean Training Ships, Ltd., 84, Leadenhall Street, London, E.C. 3.

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Newcastle Protection and Indemnity Association: Chairman, Sir William J. Noble, Bt.; Manager, Jas Ferguson: Address, 4, Queen Street, Newcastle-on-Tyne.

Newcastle War Risks Indemnity Association, Ltd.: Chairman, J. Walter Burnett; Manager, Jas. Ferguson: Address, 4, Queen Street, Newcastle on-Tyne.

Newport Shipowners' Association: Chairman, Fred. Jones; Secretary, J. A. Evans: Address, 86, Dock Street, Newport, Mon.

North-East Coast Engineering Trades Employers' Association: Secretary, James Cameron: Address, Bolbec Hall, Newcastle-on-Tyne.

North of England Protecting and Indemnity Association: Chairman, Jas. Emery Tully; Vice-Chairman, John Denholm; Managers, J. Stanley Todd and Frederick Miller; Assistant Manager, S. M. Todd; Telephones, Central 5221-2-3; Telegrams, "Norprindem, Newcastle": Head Office, 32, Collingwood Buildings, Newcastle-on-Tyne.

North of England Steamship Owners' Association: Chairman, R. J. Thompson, J.P.; Vice-Chairman, W. A. Souter; Hon. Treasurer, J. T. Lunn; Secretary, William T. Todd; Telephone, Central 1270; Telegrams, "Nemesis, Newcastle-on-Tyne": Address, 6, Sandhill, Newcastle-on-Tyne.

Officers' Association: Presidents, Earl Beatty, Earl Haig and Air-Marshal Sir H. M. Trenchard: Address, 48, Grosvenor Square, London, W. 1.

Register and Record Office of Shipping and Seamen. *See* General Register and Record Office of Shipping and Seamen.

Registry of Business Names: Registrar, H. Birtles; Assistant Registrar, A. E. Campbell-Taylor, O.B.E.: Address, 3 and 4, Clement's Inn, Strand, London, W.C. 2.

River Thames Dry Dock Proprietors' and Shiprepairers' Association: Secretary, C. A. Page: Address, 1, Lloyd's Avenue, London, E.C. 3.

Royal Corps of Naval Constructors: Director of Naval Construction, W. J. Berry, C.B.; Director of Warship Production, E. J. A. Pearce, O.B.E.; Deputy Director of Naval Construction, C. F. Munday; Assistant Directors, E. L. Attwood, W. H. Carter and A. W. Johns: Address, Department of Naval Construction, The Admiralty, Whitehall, London, S.W. 1.

Royal Merchant Seamen's Orphanage: Chairman, Sir Thos. L. Devitt, Bt.; Treasurer, The Rt. Hon. Lord Inchcape of Strathnaver, G.C.M.G., G.C.I.E., K.C.S.I.; Secretary, F. W. Rawlinson, C.B.E.: Address, Dixon House, Lloyd's Avenue, London, E.C. 3.

Royal Naval Benevolent Society: President, Admiral of the Fleet Lord Walter T. Kerr, G.C.B.; Secretary, Paymaster Captain Edward H. Shearme, C.B.E., R.N.: Address, 18, Adam Street, Adelphi London, W.C. 2.

Royal National Lifeboat Institution: President, H.R.H. The Prince of Wales, K.G.; Chairman, Sir Godfrey Baring, Bt.; Deputy Chairman, The Hon. George Colville; Secretary, G. F. Shee, M.A.; Telephone, Gerrard 2161; Telegrams, "Lifeboat Institution, London": Address, 22, Charing Cross Road, London, W.C. 2.

Royal United Service Institution: President, Field Marshal H.R.H. The Duke of Connaught, K.G.; Chairman of the Council, Admiral Sir R. G. O. Tupper, G.B.E., K.C.B., C.V.O.; Vice Chairman, Field-Marshal Sir W. R. Robertson, Bart., G.C.B., G.C.M.G., K.C.V.O., D.S.O.; Secretary, Lieut.-Colonel Sir A. Leetham, C.M.G., F.S.A.: Address, Whitehall, London, S.W. 1.

Sailing Ship Mutual Insurance Association, Ltd.: Secretary, J. F. Peincke: Address, 49, Leadenhall Street, London, E.C. 3.

Salvage Association, Inc.: Chairman, P. G. Mackinnon; Deputy Chairman, F. Templeman; Secretary, Sir Joseph Lowrey, K.B.E.; Assistant Secretaries, F. C. Sadler and A. Muir Smith; Telegrams, "Wreckage, London": Address, 19, Birchin Lane, London, E.C. 3.

Scottish Shipmasters' and Officers' Association: Now amalgamated with the Mercantile Marine Service Association, *q.v.*

Seamen's Hospital Society: President, Commander H.R.H. The Duke of York, K.G., G.C.V.O., R.N.; Treasurer, Colonel Sir R. Williams, Bt., M.P.; Secretary, Sir James Michelli, C.M.G.; Telephone, Greenwich 370: Address, Seamen's Hospital, Greenwich, London, S.E. 10.

Seamen's National Insurance Society: Chairman of Management Committee, Sir Norman Hill, Bt.: Treasurer, Accountant-General to the Board of Trade; Secretary, Sidney H. Godfrey: Address, 19, Leman Street, London, E. 1.

Shipbuilding Employers' Federation: Secretary, Sir Chas. J. O. Sanders, K.B.E.; Assistant Secretary, A. Belch: Address, 9, Victoria Street, Westminster, London, S.W. 1.

Ship Constructors' and Shipwrights' Association: General Secretary, Alex. Wilkie, M.P., C.H.; Telephone, Central 1886; Telegrams, "Wilkie, Newcastle"; Registered Offices, 8, Eldon Square, Newcastle-on-Tyne.

Shipowners' Parliamentary Committee: Chairman, Hon. Alex. Shaw, M.P.; Vice-Chairman, Sir Thomas Royden, Bt., C.H.; Secretary, H. M. Cleminson: Address, 28, St. Mary Axe, London, E.C. 3.

Shipowners' Protection and Indemnity Association, Ltd.: Managers, John Holman and Sons: Address, 1, Lloyd's Avenue, London, E.C. 3.

Shipping Federation, Ltd.: President, Sir Thomas L. Devitt, Bt.; Chairman of Executive Council, Sir Shadforth Watts; Vice-Chairman Executive Council, F. C. Allen; General Manager, Cuthbert Laws; Secretary, Michael Brett; Telephones, Avenue 6108 and 6109; Telegrams, "Traffic, Led, London": Chief Office, 52, Leadenhall Street, London, E.C. 3.

Soldiers', Sailors' and Airmen's Families' Association: Chairman, Lieut-General The Hon. Sir Frederick W. Stopford, K.C.B., K.C.M.G., K.C.V.O.; Vice-Chairman, The Countess of March, C.B.E.; Hon. Treasurer, Major-General C. R. R. McGrigor, C.B., C.M.G.; Secretary and Organiser, Captain Sir George E. Wickham Legg, K.Ba.E., M.V.O.; Telephone, Victoria 396; Telegrams, "Gildea, Parl., London": Head Office, 23, Queen Anne's Gate, Westminster, London, S.W. 1.

South Coast Engineering and Shipbuilding Employers' Association: Secretary, William Nelson: Address, Western Chambers, Canute Road, Southampton.

Standard Ship Owners' Mutual Freight Dead Weight, Demurrage and Defence Association, Ltd.: Chairman, Sir Frederick Lewis, Bart.; Managers, Charles Taylor and Co.; Telephone, Avenue 4021; Telegrams, "Adno, Fen, London": Address, 9, Fenchurch Avenue, London, E.C. 3.

Standard Steamship Owners' Mutual War Risks Association, Ltd.: Chairman, Sir Frederick Lewis, Bart.; Managers, Charles Taylor and Co.; Telephone, Avenue 4021; Telegrams, "Adno, Fen, London": Address, 9, Fenchurch Avenue, London, E.C. 3.

Standard Steam Ship Owners' Protection and Indemnity Association, Ltd.: Chairman, Sir Frederick Lewis, Bart.; Managers, Charles Taylor & Co.; Telephone, Avenue 4021; Telegrams, "Adno, Fen, London": Address, 9, Fenchurch Avenue, London, E.C. 3.

Suez, Compagnie Universelle du Canal Maritime de: President, C. Jonnart; Chairman of London Committee and Vice-President, Lord Inchcape, G.C.M.G., K.C.S.I., K.C.I.E.; Secretary, George E. Bonnet: Address, 3, Whittington Avenue, Leadenhall Street, London, E.C. 3.

Sunderland Shipowners' Society: President, Lord Durham; Chairman, Ernest F. Dix; Secretary, J. G. Rutherford: Address, 45, West Sunniside, Sunderland.

Swansea Chamber of Commerce and Shipping: Chairman, Trevor Bowen; Vice-Chairman, Ivor A. Ambrose; Secretary, Henry J. Marshall; Assistant Secretary, C. Leakey; Telephone, Central 18; Telegrams, "Commerce, Swansea": Address, Chamber of Commerce, Swansea.

Tees and Hartlepool Shipbuilders' Association: Secretary, Allan Kennedy: Address, "Kinnoull," Dovecot Street, Stockton-on-Tees.

Thames Nautical Training College: Chairman, The Rt. Hon. Lord Inchcape of Strathnaver, G.C.M.G., K.C.S.I., K.C.I.E.; Captain Superintendent, Captain M. B. Sayer, C.B.E., R.N.R.; Head Master, T. R. Beatty, M.A.; Secretary, F. H. Stafford: Address, 72, Mark Lane, London, E.C. 3.

Trinity House, Honourable Corporation of: Master, Field-Marshal The Duke of Connaught, K.G.; Deputy-Master, Captain Sir H. Acton Blake, K.C.M.G., K.C.V.O.: Secretary, M. K. Smith, O.B.E.: Address, Tower Hill, London, E.C. 3.

Tyne Shipbuilders' Association: Secretary, James Cameron: Address, Bolbec Hall, Westgate Road, Newcastle-on-Tyne.

Underwriters and Insurance Brokers in Glasgow, Association of: Committee, John M. Lamont (Chairman), Robert Law, Hugh M. Parker, Charles G. Fulton, Richard Gibson, Wm. Calderwood, George Jackson, and William McInnes; Secretary and Treasurer, William Stewart: Address, Underwriters' Rooms, Royal Exchange Buildings, Glasgow.

United Kingdom Mutual Steamship Assurance Association, Ltd.: Chairman, Sir Walter Runciman, Bt.; Managers, T. R. Miller & Son; Telephone, Avenue 2552; Telegrams, "Mutuality, Stock, London": Address, 24, St. Mary Axe, London, E.C. 3.

Wear Shipbuilders' Association: Secretary, F. J. Carlyle: Address, York Chambers, St. John Street, Sunderland.

West of England Light Shipbuilders' Association: Secretary, J. A. S. Hassal: Address, 6, Lord Street, Liverpool.

West of England Mutual War Risks Association, Ltd.: Managers, John Holman and Sons: Address, 1, Lloyd's Avenue, London, E.C. 3.

West of England Steamship Owners' Protection and Indemnity Association, Ltd: Chairman, Sir Shadforth Watts; Vice-Chairman, Sir John B. Wimble; Managers, John Holman & Sons: Address, 1, Lloyd's Avenue, London, E.C. 3.

# COLONIAL AND FOREIGN SHIPPING ASSOCIATIONS

## AUSTRALIA.

Australasian Steamship Owners' Federation: Secretary, H. M. Adams: Address, Steamship Buildings, 509, Collins Street, Melbourne.
Merchant Service Guild of Australasia: Secretary, W. G. Lawrence: Address, 79–81, Pitt Street, Sydney, N.S.W.
United Service Institution of New South Wales: Secretary, Lieut. Frederick Daniell: Address, 12–14, O'Connell Street, Sydney, N.S.W.

## BELGIUM.

Antwerp Chamber of Commerce: Address, Local de la Bourse, Antwerp.
Antwerp Ship Repairers' Federation: Address, General Buildings, 14, Place de Meir, Antwerp.
Fédération Maritime: Address, Courte rue des Claires, 2, Antwerp.
International Shipping Federation, Ltd. (Belgian Branch): General Secretary, J. F. Drory: Address, 7, Quai Van Dyck, Antwerp.
Union des Armateurs Belges: President, Léon Dens; Secretary, Emile Deckers: Address, Longue Rue Neuve, 132, Antwerp.

## CANADA.

American Association of Port Authorities: Address, Montreal.
Shipping Federation of Canada: President, R. W. Reford; Manager and Secretary, Thomas Robb: Address, 218, Board of Trade Building, Montreal.

## CHINA.

China Coastwise Association: Address, Hong Kong.

## DENMARK.

Assuranceforeningen Skuld. (Danish Branch): Address, Amaliegade 29A, Copenhagen.
Baltic and White Sea Conference: President, Theodore E. Salvesen; Secretary, J. F. Myre: Address, 7, Toldbodvei, Copenhagen.
Dansk Dampskibsrederiforening (Danish Steamship Owners' Association): President, Chr. Sass; Secretary, E. Maegaard: Address, Amaliegade 29A, Copenhagen.
International Shipping Federation, Ltd. (Danish Branch): General Secretary, A. O. Andersen: Address, Amaliegade 29A, Copenhagen.

## FRANCE.

Bureau des Longitudes (Publishers of the French Nautical Almanac): Address, Palais de l'Institut, 3, Rue Mazarine, Paris.
Comité Central des Armateurs de France: Chairman, Denis Pérouse; General Secretary, Paul de Rousiers: Address, 73, Boulevard Haussmann, Paris ($8^e$).
Compagnie Universelle du Canal Maritime de Suez: Address, rue d'Astorg, 1, Paris, ($8^e$).

## GERMANY.

Bremer Reederverein: Address, Haus Schütting, Bremen.
International Shipping Federation, Ltd., The, (German Branch): General Secretary, Dr. Paul Ehlers: Address, Adolphsbrücke 9, Hamburg.
Reederverein für den Bezirk der Handelskammer zu Flensburg: Address, Flensburg.
Reedereiverein zu Lübeck: Address, Breitestrasse 6, Lübeck.
Rostocker Reederverein: Address, Rostock.
Schutzverein Deutscher Reeder (Protection Association of German Shipowners): Manager, J. L. Bartelsen: Address, Alsterstrasse 1, Hamburg 1.
Verein Hamburger Reeder: Address, Mönckebergstrasse 27 II, Hamburg.
Verein Stettiner Reeder: Address, Börse, Stettin.
Wirtschaftsausschuss der Deutschen Reederei: President, Dr. h. c. Sh. Heineken; Managing-President, Staatsminister a. D. Graf. von Rhoedern: Address, Adolphsbrücke 9 (III), Hamburg.
Zentralverein Deutscher Reeder: President, Marius Böger: Managing-President, Staatsminister a. D. Graf. von Rhoedern: Address, Adolphsbrücke 9 (III), Hamburg.

## HOLLAND.

Bond van Werkgevers in de Koopvaardy (Union of Employers in the Merchant Marine): Address, Rotterdam.

Centrale van Koopvardy-officierin (Central Union of Merchant Marine Officers): Address, Rotterdam.

International Shipping Federation, Ltd. (Dutch Branch): Secretary, J. Stakenburg: Address, Parklaan, 8, Rotterdam.

Nederlandsche Reedersvereeniging: President, Dr. H. J. Knottenbelt; Secretary, J. C. P. Krayenhoff van de Leur; Assistant Secretary, Dr. F. W. A. de Kock van Leeuwen: Address, Stationsweg 135, The Hague.

Scheepvaart Vereeniging "Nord" ("North" Shipping Association): Address, Amsterdam.

Scheepvaart Vereeniging "Zuid" ("South" Shipping Association): Address, Rotterdam.

## INDIA.

United Service Institution of India: Address, Simla.

## ITALY.

Federazione Armatori Italiani: Secretaries, Cav. Uff. G. Trucco and A. G. V. Perosio: Address, Via XX Septembre 19–4, Genoa.

Federazione degli Armatori Liberi Italiani: President, Emanuele V. Parodi; Secretary, Carlo Raimondo: Address, Salita S. Caterina 4, Genoa.

## JAPAN

Japanese Merchant Marine Officers' and Engineers' Association: Secretary, Yojiro Tsudzuki: Address, No. 180, 8 Chome, Shimoyamate—Dori, Kobe.

Nippon Shipowners' Association: Managing Director, Z. Kamiya: Address, 32, Akashi Machi, Kobe.

## NORWAY.

Assuranceforeningen Skuld.: President, Otto Thoresen; Managing Directors, Sir Anton Poulsson, K.B.E., and Einar Poulsson; Address, Carl Johansgate 1, Postbox 129, Christiania

Det Norske Veritas: Address, Konensgt, 2, Christiania.

Nordisk Skibsrederforening: President, Otto Thoresen; General Manager, J. Jantzen: Address, Drammensveien, 21, Christiania.

Norges Rederforbund: President, Gustav Henriksen; Secretary, W. Klaveness: Address, Stortingsgt, 16, Christiania.

Skibsbyggeriernes Landsforening: Address, Schestedsgt, 3, Christiania.

## SPAIN.

"Almanaque Nautico" (The Spanish Nautical Almanac). *See* Observatorio de Marina.

Asociaciòn de Navieros de Bilbao: President, Sir Ramón de la Sota, K.B.E.; Secretary, Antonio Arroyo: Address, Ibañez de Bilbao, 22, Bilbao.

Observatorio de Marina (Publishers of the Spanish "Almanaque Nautico"); Director, Señor Leon Herrero: Address, San Fernando, Cadiz.

## SWEDEN.

International Shipping Federation, Ltd. (Swedish Branch): General Secretary, O. A. Nordborg: Address, Sveriges Redareforening, Kungsportsavenyen, 1, Gothenburg.

Svenska Teknologföreningen adv. för Skeppsbyggnadskonst (Association of Swedish Engineers and Architects—Section for Naval Architecture): Address, Stockholm, 16.

Sveriges Allmänna Sjöfartsförening (Swedish General Shipping Association): Address, Hantverkaregatan 32, Stockholm.

Sveriges Angfartygs Assurans Förening: Address, Gothenburg.

Sveriges Redareforening (Swedish Shipowners' Association): President, Dan Broström; Secretary, O. A. Nordborg: Address, Kungsportsavenyen, 1, Gothenburg.

Sveriges Segelfartygsforening: Address, Ombudsmannen, Raa pr. Raus.

## UNITED STATES.

American Association of Port Authorities: President, M. P. Fennell; Secretary, Tiley S. McChesney: Address, Room 200, New Orleans Court Building, New Orleans, Louisiana

American Bureau of Shipping: Secretary, J. W. Cantillion: Address, 50, Broad Street, New York.

American Manufacturers' Export Association: Secretary, M. B. Dean: Address, 160, Broadway, New York City.

American Marine Association: President, Colonel E. A. Simmons; Secretary, K. Warren Heinrich: Address, 15, Park Row, New York, N.Y.

American Steamship Owners' Association: President, Alfred Gilbert Smith; Vice-President and General Manager, Winthrop L. Marvin: Address, 11, Broadway, New York.

American Steamship Owners' Mutual Protection and Indemnity Association: Address, 49 and 51, Wall Street, New York, N.Y.

Maritime Association of the Boston Chamber of Commerce: Chairman, Edward E. Blodgett; Manager, Frank S. Davis: Address, 177, Milk Street, Boston 9, Mass.

Master Boiler Makers' Association: Secretary, H. D. Vought: Address, 26, Cortlandt Street New York City.

National Association of Engine and Boat Manufacturers: Secretary, R. R. Hand: Address: 29, West 39th Street, New York.

National Merchant Marine Association: President, Hon. Joseph E. Ransdell: Secretary, Mr. Henry C. Wiltbank: Address, Munsey Building, Washington, D.C.

National Rivers and Harbours Congress: Secretary, S. A. Thompson: Address, 824, Colorado Building, Washington, D.C.

Nautical Almanac: Director of the Almanac, Captain Eichelberger (Math), U.S.N.: Address, United States Naval Observatory, Washington, D.C.

Pacific American Steamship Association: President, Captain Robert Dollar; Secretary-Treasurer, J. P. Williams: Address, 336, Battery Street, San Francisco, California.

Port of New York Authority: Secretary, Wm. Leary: Address, 11, Broadway, New York.

Shipowners' Association of the Pacific Coast: President, R. W. Myers: Secretary-Treasurer, W. F. Sullivan: Address, 336, Battery Street, San Francisco, California.

United States Shipping Board Emergency Fleet Corporation: Address, Washington, D.C.

# BRITISH AND FOREIGN SHIPOWNERS.

(For particulars of the Steamship Services of the lines and firms given in this list see "The Steamship Services of the World" on page 604.)

Aberdeen Line, 7, Billiter Square, London, E.C. 3.
Aberdeen, Newcastle and Hull Steam Co., Ltd., 79, Regent Quay, Aberdeen.
Aberdeen Steam Navigation Co., Ltd., 87, Waterloo Quay, Aberdeen.
Adelaide Steamship Co., Ltd., Steamship Buildings, Currie St., Adelaide, South Australia; Yuills, Ltd., 120, Fenchurch St., London, E.C. 3.
Admiral Line, Rust Building, Tacoma, Wash., and L.C. Smith Building, Seattle, Wash., U.S.A.
African Steamship Co., 23, Billiter St., London, E.C. 3.
Alaska Steamship Co., Pier 2, Seattle, Wash., U.S.A.
Albany Steam Navigation Co., Ltd., 125, Bute Street, Cardiff.
Albyn Line, Ltd., York Chambers, Sunderland.
Alder, Ltd., Geo., Court Chambers, Albert Road, Middlesbrough.
Alexander Bros., Newcastle-on-Tyne.
Alexander and Mair, 81, Mitchell Street, Glasgow.
Alexandra Towing Co., Ltd., 25, Drury Buildings, 21, Water Street, Liverpool.
Allan Line, 25, Bothwell St., Glasgow.
Amalgamated Industrials, Ltd., Head Office, Alexandra House, 9, Union Court, Old Broad St., London, E.C. 2. Associated Companies: G. Heyn and Sons, Ltd., *q.v.*, and the Cork Steamship Co., Ltd., *q.v.*
American-Hawaiian Steamship Co., 215, Market Street, San Francisco, Cal., U.S.A.
American Italian Steamship Co., 52, Broadway, New York City, U.S.A.
American Line: Head Offices, Canute Road, Southampton; London Offices, 1, Cockspur Street, S.W. 1. Associated with the International Navigation Co. of New Jersey, *q.v.*
American Petroleum Co., Ltd., 22, Willemsekade, Rotterdam, Holland
Anchor-Brocklebank and Well Lines: Owners, T. and J. Brocklebank, Ltd., *q.v.*
Anchor-Donaldson, Ltd., 14, St. Vincent Place, Glasgow.
Anchor-Donaldson Line: Owners, Anchor-Donaldson, Ltd., *q.v.*
Anchor Line: Owners, Anchor Line (Henderson Brothers), Ltd., *q.v.*
Anchor Line (Henderson Brothers), Ltd.: Head Office, Anchor Line Buildings, St. Vincent Place, Glasgow; London Office, 16, Gracechurch St., E.C. 3.
Anderson, Green and Co., Ltd., Head Office, 5, Fenchurch Avenue, London, E.C. 3.
Andreson, Chr., Amaliegade, 29A, Copenhagen, K., Denmark. Managing Owner for Dampskibsselskabet Dania.
Anglo-American Oil Co., Ltd., 36, Queen Anne's Gate, Westminster, London, S.W. 1
Anglo-Celtic Shipping Co., Ltd., 3, Pier Head Chambers, Bute Street, Cardiff.
Anglo-Egyptian Oilfields, Ltd., St. Helen's Court, Leadenhall Street, London, E.C. 3.
Anglo-Grecian Steam Trading Co., Ltd., 18-20, Creechurch Lane, London, E.C.3.
Anglo-Saxon Petroleum Co., Ltd., Head Office, St. Helen's Court, Leadenhall St., London, E.C. 3.
Anning Brothers, Merchants' Exchange, Cardiff.
Antrim Iron Ore Company, Ltd., 1, Victoria Chambers, Victoria Street, Belfast.
Arab Steamers, Ltd., 40, Church Gate Street, Fort, Bombay.
Argentine Navigation Co. (Nicholas Mihanovitch), Ltd., 36, Lime Street, London, E.C. 3.
"Argo" Dampfschiffahrtsgesellschaft, Langenstrasse, 104-106, Bremen, Germany.
"Artus" Danziger Reederei und Handels A.-G., Kohlenmarkt 9, Danzig.
Asiatic Steam Navigation Co., Ltd, The: Managers, Turner and Co., *q.v.*
Aster Shipping Co., Ltd., 120, Merchants' Exchange, Cardiff.
Astigarraga, Hijos de; Bertendona No. 4, Bilbao, Spain.
"Atalantia," Dampskibsselskabet, Malmogade 3, Copenhagen, Denmark.

Atkinson and Prickett, E. E., Kingston Chambers, Land of Green Ginger, Hull.
Atkinson and Sons, E. P., 3, St. John Street, Goole.
Atlantic Fruit Company, Inc., 17, Battery Place, New York, U.S.A.
Atlantic, Gulf & West Indies Steamship Lines, 25, Broadway, New York, U.S.A.
Atlantic Line: Branch of White Star Line, *q.v.*
Atlantic Refinery Co., 3144, Passyunk Avenue, Philadelphia, Pa., U.S.A.
Atlantic Transport Co., of West Virginia, 1, Broadway, New York, U.S.A.
Atlantic Transport Line, 1, Broadway, New York, U.S.A., and 38, Leadenhall St., London. E.C. 3.
Australasian United Steam Navigation Co., Ltd., 122, Leadenhall St., London, E.C. 3.
Australian Commonwealth Line of Steamers: Head Office in England, Australia House, Strand, London, W.C. 2; Head Office in Australia, 15, O'Connell Street, Sydney, N.S.W.
Australian Steamships Pty., Ltd., 35-45, Market St., Melbourne, and 33, Cornhill, London, E.C. 3.
Bachke and Co., Trondhjem, Norway.
Bain, Sons and Co., Portreath, Redruth, Cornwall.
Balls and Son, W. D. C., 60, Tyne Street, North Shields.
Baltimore and Carolina Steamship Co., Pier 5, Pratt Street, Baltimore, U.S.A.
Baltische Reederei, 36, Admiralitätstrasse, Boltenhof, Hamburg, Germany.
Bannister, A., Fish Dock Road, Grimsby.
Barber and Co., Inc., Whitehall Building, 17, Battery Place, New York, U.S.A.
Barber Steamship Lines, Ltd., 19, James Street, Liverpool.
Bay Steamers, Ltd., 468, Collins Street, Melbourne, Victoria, Australia.
Bear Creek Oil and Shipping Co., Ltd.: Managers, C. Bowring & Co., Ltd., *q.v.*
Beattie, J., 47, Lowther Street, Whitehaven.
Becker and Co., Ltd., 34-40, Ludgate Hill, London, E.C. 4.
Becker, W. H., 414, Kirby Building, Cleveland, Ohio, U.S.A.
Beckingham and Co., Milburn House, Newcastle-on-Tyne.
Belfast and Mersey Steamship Co.. Ltd., 2, Corporation Square, Belfast.
Belfast Steamship Co., Ltd.: Head Office, 42 & 43, Donegal Quay, Belfast; Liverpool Office, Royal Liver Building; London Office, 29, Cockspur St., S.W. 1.
Belgian Government (Administration de la Marine), 90, Rue de la Loi, Brussels, Belgium.
Bell Brothers and Co., 135, Buchanan Street, Glasgow.
Bell & Co., James, Bell Chambers, Paragon St., Hull.
Belle Steamers, Ltd., 7, Swan Lane, Upper Thames Street, London, E.C. 4.
Ben Line Steamers, Ltd.: Managing Owners, William Thompson & Co., *q.v.*
Bennett Line: Owners, Bennett Steam Ship Co., Ltd., *q.v.*
Bennett Steam Ship Co., Ltd., Bank Chambers, Goole.
Bergen Lloyd, Bergen, Norway.
Bergenske Dampskibsselskab, Det, Head Office, Post Box 215, Bergen, Norway.
Bergesen, Sigval, Stavanger, Norway.
Bergh and Helland, Post Box 25, Bergen, Norway.
Best and Co., T. G., 332, Royal Liver Building, Liverpool.
Bibby Line, 26, Chapel St., Liverpool, and 135, Font St., New York, U.S.A.
Birkenhead Corporation Ferries, Woodside Ferry, Birkenhead.
Black and Co., Ltd., John: Joint Managers with Donaldson Bros., Ltd., of Donaldson South American Line, *q.v.*
Bland Line (Managing Owners, M. H. Bland and Co., Ltd.), Cloister Building, Gibraltar; London agents, Watts, Watts and Co., Ltd., 7, Whittington Avenue, Leadenhall St., E.C. 3.
Blue Funnel Line: Managers, Alfred Holt & Co., *q.v.*
Blue Star Line, Ltd., Holland House, Bury St., London, E.C. 3.
Bolten, Aug., Wm. Miller's Nachfolger, 36, Admialtätstrasse, Boltenhof, Hamburg, Germany.
Bolton and Co., F., 16, St. Helen's Place, London, E.C. 3.
Bombay and Persia Steam Navigation Co., Ltd., 16, Bank Street, Fort, Bombay.
Bombay Steam Navigation Co., Ltd., 120, Frere Road, Bombay.
Booth Line, Cunard Building, Liverpool, and 11, Adelphi Terrace, London, W.C. 2.
Bowring & Co., Ltd., C. T.: Head Office, 20, Castle St., Liverpool; London Office, 52, Leadenhall Street, E.C. 3.
Bowring Steamship Co., Ltd.: Managers, C. T. Bowring & Co., Ltd., *q.v.*
Bristol Channel Steamers, Ltd., 68-69, The Exchange, Cardiff.
Bristol City Line of Steamers, Ltd., Albion Dockyard, Bristol.
Bristol Steam Navigation Co., Ltd., 50, Prince Street, Bristol.
British Africa Shipping and Coaling Co., Ltd., Cape House, Cape Town.
British and African Steam Navigation Co., Ltd., Colonial House, Water St. Liverpool.

British and Argentine Steam Navigation Co., Ltd. (Associated Company of the Furness-Houlder Argentine Lines, Ltd.): 53, Leadenhall Street, London, E.C. 3.
British and Continental Steamship Co., Ltd., Hamilton Buildings, 24, Chapel Street, Liverpool.
British India Steam Navigation Co., Ltd., Head Office, 122, Leadenhall St., London, E.C. 3; Agents in India: Mackinnon, Mackenzie & Co., Chief Office, Calcutta.
British India Line: Owners, British India Steam Navigation Co., Ltd., *q.v.*
British and Irish Steam Packet Co., Ltd., Head Office, 27, Sir John Rogerson's Quay, Dublin; London Office, 1, Seething Lane, E.C. 3.
British Rhineland Navigation and Transport Co., Ltd.: Managers, Burton, Smart and Orford, Ltd., *q.v.*
British Tanker Co., Ltd., Salisbury House, London Wall, London, E.C. 2.
Brocklebank, Ltd., T. & J. (Anchor-Brocklebank & Well Lines), Cunard Building, Liverpool.
Broström, Dan, 5, Packhusplatsen, Gothenberg, Sweden.
Brown, James and Alexander: Head Offices, 1, Bolton Street, Newcastle, N.S.W., Australia; London Offices, 88, Fenchurch Street, E.C. 3.
Brown Shipping Co. (Newcastle), Ltd., The: Managers, Robinson, Brown and Co., *q.v.*
Brunsgaard, Kiosteruds Damps., Drammen, Norway.
Bugge, N., Tonsberg, Norway.
Bull & Co., A. H., 40, West Street, New York, U.S.A.
Burns and Laird Lines, Ltd., 52, Robertson Street, Glasgow.
Burns Ltd., G. & J., Head Office, 30, Jamaica St., Glasgow.
Burns, Philp and Co., Ltd., 7, Bridge Street, Sydney, N.S.W.
Burns Steamship Co., Ltd., The: Managers, G. and J. Burns, Ltd., *q.v.*
Burton, Smart and Orford, Ltd., Head Office, 10 and 11, Lime St., London, E.C 3.
Byron Steamship Co., Ltd., Port of London Authority Building, Seething Lane, London, E.C. 3.
Cairn Line of Steamships, Ltd. *See* Cairns, Noble & Co., Ltd.
Cairns, Noble & Co., Ltd., Head Office, Akenside House, Side, Newcastle-on-Tyne; London Office, 32, Great St. Helens, E.C. 3.
Camillo Tank Steamship Co., Ltd., The: Managers, C. T. Bowring and Co., Ltd., *q.v.*
Canada Steamship Lines, Ltd., 9–11, Victoria Square, Montreal.
Canadian Government Merchant Marine Ltd.: Head Office, 230, St. James St., Montreal; London Office, 17–19, Cockspur St., S.W. 1; New Zealand Office, Ferry Building, Quay St., Auckland.
Canadian Pacific Steamships, Ltd., Head Office, 8, Waterloo Place, Pall Mall, London, S.W. 1.
Canadian Pacific Railway Co.'s Ocean Steamship Line. *See* Canadian Pacific Steamships, Ltd.
Carlsson, G., Gothenberg, Sweden. *See* also Transatlantic S.S. Co., Ltd.
Carron Line, 125, Buchanan Street, Glasgow.
Cayzer, Irvine & Co., Ltd.: Head Office, 2, St. Mary Axe, London, E.C. 3.
Chambers & Co., James, 3 & 5, King St., Liverpool.
Chapman and Son, R., Maritime Buildings, Newcastle-on-Tyne.
Chargeurs Réunis, Cie. Française de Navigation à Vapeur, 3, Boulevard Malesherbes, Paris.
Charlton and Co., Ltd., Royal Dock, Grimsby.
Chellew Steam Navigation Co., Ltd., R. B., 47, Stuart Street, Cardiff.
Cheong Yue Steamship Co., Ltd., 5, Queen's Road Central, Hong Kong.
Chicago, Duluth and Georgian Bay Transit Co., 110, W. Adams Street, Chicago, Ill., U.S.A.
China-Australia Steamship Co., Ltd., Foreman House, 266A, George Street, Sydney, N.S.W.
China Mail Steamship Co., Ltd., 510, Montgomery Street, San Francisco, Cal., U.S.
China Mutual Steam Navigation, Co, Ltd. (known as the Blue Funnel Line): Managers, Alfred Holt and Co., *q.v.*
China Navigation Co., Ltd., 8, Billiter Square, London, E.C. 3.
"City" Line: Head Office, 75, Bothwell, St., Glasgow; Liverpool Office, 22, Water St.; London Agents, Montgomerie and Workman (1920), Ltd., 104–106, Leadenhall St., E.C 3. Owners of "City" Line, Ellerman's Lines, Ltd., *q.v.*
Clan Line Steamers, Ltd., The: 2, St. Mary Axe, London, E.C. 3.
Clarke, Stephenson & Co., Ltd., Head Office 4, St. Dunstan's Alley, London, E.C. 3.
Cleveland-Cliffs Iron Co., 11th Floor, Kirby Building, Cleveland, Ohio, U.S.A.
Clyde Shipping Co., Ltd., 21, Carlton Place, Glasgow, and 138, Leadenhall St., London, E.C. 3.
Clyde Steamship Co.: Head Office, Pier 36, North River, New York, U.S.A.

Coast Lines, Ltd.: Head Office, Royal Liver Building, Liverpool; London Office, 1, Seething Lane, E.C 3

Commonwealth & Dominion Line, Ltd., 9 & 11, Fenchurch Avenue, London, E.C. 3

Compagnie Générale Transatlantique, 6, Rue Auber, Paris, and 4, Lloyd's Avenue, London, E.C. 3.

Compagnie Havraise Péninsulaire de Navigation à Vapeur; Head Office, 10, Rue de Châteaudun, Paris; London Agents, Thomas and Son, 26, Billiter St., E.C. 3.

Companhia Commercio e Navegação, 37, Avenida Rio Branco (Caixa 482), Rio de Janeiro, Brazil.

Companhia Nacional de Navegação Costeira, 303–331, Avenida Rodrigues Alves, Rio de Janeiro, Brazil.

Compañia Transatlantica, Cadiz, Spain.

Compañia Trasmediterránea, Head Office, Gran Via Layetana 2, Barcelona, Spain; London Office, 20, Copthall Avenue, E.C.

Cork Steamship Co., Ltd., Alexandra House, 9, Union Court, Old Broad St., London, E.C. 2.

Cornborough Shipping Line, Ltd., The: Managing Owners, Sir William Reardon Smith and Sons., Ltd., *q.v.*

Cory Colliers, Ltd., Cory Buildings, Fenchurch Street, London, E.C. 3.

Cory & Sons, Ltd., John, Mount Stuart House, Cardiff: London Agents, Ockenden & Son, 4, St. Mary Axe, E.C. 3.

Cunard Line: Owners, Cunard Steam Ship Co., Ltd., *q.v.*

Cunard Steam Ship Co., Ltd.: Head Office, Cunard Building, Pier Head, Liverpool; London Office, 51, Bishopsgate, E.C. 2.

Currie & Co., James: Head Office, 16, Bernard St., Leith; and 63, Fenchurch Street, London, E.C. 3.

Currie Line: Owners, The Leith, Hull and Hamburg Steam Packet Co., Ltd.; Managers, James Currie & Co., *q.v.*

Dalgliesh, Ltd., R. S.: Head Office, Watergate Buildings, Sandhill, Newcastle-on-Tyne; London Office, 22, Billiter St., E.C. 3.

Dalgliesh Steam Shipping Co., Ltd.: Managers, R. S. Dalgliesh, Ltd., *q.v.*

Dampskibsactieselskabet Otto Thoresens Linie, Prinsengade 1, Christiania.

Denmark State Railways (De Danske Statsbaner), Trommesalen, 5, Copenhagen, B., Denmark.

Det Forenede Dampskibs-Selskab Aktieselskab: Head Office, Kvæsthusgade 7 and 9B, Copenhagen, K., Denmark; London Agents, The United Shipping Co., Ltd., 108, Fenchurch St., E.C. 3.

Devon Shipping Co., Ltd.: Managing Owners, Harrison, Sons and Co., Ltd., *q.v.*

Dominion Line: purchased by Frederick Leyland and Co., Ltd., *q.v.*

Donaldson Bros., Ltd., Joint Managers with John Black and Co., Ltd., of Donaldson South American Line, Ltd., *q.v.*

"Donaldson" Line, Ltd.: Head Office, 14, St. Vincent Place, Glasgow; London Office, 16, Gracechurch St., E.C. 3.

Donaldson South American Line, Ltd.: Head Office, 14, St. Vincent Place, Glasgow; London Office, 16, Gracechurch St., E.C. 3.

Eagle Oil Transport Co., Ltd., 16, Finsbury Circus, London, E.C. 2.

East Asiatic Co., Ltd. (United Baltic Corp., Ltd., 158, Fenchurch St., London, E.C. 3), 2, Holbergsgade, Copenhagen, Denmark.

Elder, Dempster & Co., Ltd., Colonial House, Water St., Liverpool, and 4, Fenchurch Avenue, London, E.C. 3.

Elders and Fyffes, Ltd., 31 and 32, Bow St., Covent Garden, London, W.C. 2.

Ellerman & Bucknall Steamship Co., Ltd., 104-106, Leadenhall St., London, E.C. 3.

Ellerman Line: Head Office, 22, Water Street, Liverpool; London Office, 104–106, Leadenhall Street, E.C. 3.

Ellerman Lines, Ltd.: Registered Office, 19–21, Moorgate, London, E.C. 2.

Ellerman's "City" and "Hall" Lines. *See* City Line; and Hall Line.

Ellerman's Wilson Line, Ltd., Hull: London Agents, The United Shipping Co., Ltd., 108, Fenchurch St., E.C. 3.

Federal Steam Navigation Co., Ltd., 2, Fenchurch Avenue, London, E.C. 3.

Finland Line, Helsingfors, Finland: Chas. Gee & Co., 17, Gracechurch St., London, E.C. 3.

Fisher, Alimonda & Co., Ltd., 110, Fenchurch St., London, E.C. 3.

France, Fenwick & Co., Ltd., Wm., 5, Fenchurch St., London, E.C. 3.

Furness-Houlder Argentine Lines, Ltd.: Head Office, 53, Leadenhall St., London, E.C. 3; Liverpool Office, 201, Royal Liver Building.

Furness Line: Owners, Furness, Withy and Co., Ltd., *q.v.*

Furness-Prince Line: Owners, Furness, Withy and Co., Ltd., *q.v.*

Furness, Withy & Co., Ltd., Furness House, Leadenhall St., London, E.C. 3.

General Steam Navigation Co., Ltd.: Head Office, 15, Trinity Square, London, E. C. 3.

Gilwen Shipping Co., Ltd.: Managing Owners, Harrison, Sons and Co., Ltd., *q.v.*

Glasgow and Highland Royal Mail Steamers: Owners, David MacBrayne, Ltd., *q.v.*

Glasgow United Shipping Co., Ltd.: Managing Owners, Maclay and McIntyre, *q.v.*

Glen Line, Ltd.: Head Office, 1, East India Avenue, London, E.C. 3.

Gould Steamship and Industrials, Ltd.: Head Office, Merthyr House, Cardiff; London Agents, J. C. Gould, Angier and Co., Ltd., Ethelburga House, Bishopsgate, E.C. 2.

Gow, Harrison & Co., 8, Gordon St., Glasgow.

Grace & Co., W. R.: Head Office, 1, Hanover Square, New York, U.S.A.; Associated Company and Agents, Grace Brothers, Ltd., 144, Leadenhall Street, London, E.C. 3.

Green Star Steamship Corporation, 24, State Street, New York, U.S.A.

Hain Steamship Co., Ltd., St. Ives, Cornwall; London Agents, Foster, Hain and Read, Ltd., 24 St. Mary Axe, E.C. 3.

Hall Bros. Steamship Co., Ltd., Royal Arcade, Newcastle-on-Tyne.

Hall Line, Ltd.: Head Office, Tower Building, Water St., Liverpool; London Office, Hall Line Agency, 104-106, Leadenhall Street, E.C. 3. (Owners, The Ellermann Lines, Ltd.)

Hamburg-Amerika Line. *See* Hamburg-Amerikanische Packetfahrt A.-G.

Hamburg-Amerikanische Packetfahrt Aktien-Gesellschaft, Alsterdamm 25, and Ferdinandstrasse 58/62, Hamburg, Germany.

Hansen, C. K., Amaliegade 29B, Copenhagen, Denmark.

Harrison Line: Owners, Thos. and Jas. Harrison, *q.v.*

Harrison, Sons & Co., Ltd.: Head Office, Dowlais Chambers, Cardiff; London Agents, H. G. Harper and Co., 14, St. Mary Axe, E.C. 3.

Harrison, Thos. and Jas.: Head Office, Mersey Chambers, Old Churchyard, Liverpool; London Office, Dock House, Billiter Street, E.C. 3.

"Head" Line & "Lord" Line: Managing Owners, G. Heyn and Sons, Ltd., *q.v.*

Henderson and Co., P. (P.O. Box, 72), 153, St. Vincent Street, Glasgow; London Agents, Galbraith, Pembroke and Co., 34, Leadenhall Street, E.C. 3.

Henderson Line: Owners, Henderson & Co., P., *q.v.*

Heyn and Sons, Ltd., G.: Head Office, Head Line Buildings, Victoria St., Belfast; Associated Company, Amalgamated Industrials, Ltd., Alexandra House, 9, Union Court, Old Broad Street, London, E.C. 2.

Hogarth & Sons, H., 24, St. Enoch Square, Glasgow; London Office, 12, Leadenhall Street, E.C. 3.

Holland-Amerika Lijn (Nederlandsch-Amerikaansche Stoomvaat-Maatschappij): Head Office, Rotterdam, Holland; London Agents, The International Navigation Co., Ltd., 1 Cockspur Street, S.W. 1. (Passenger); and Phs. van Ommeren (London) Ltd., 27, Leadenhall Street, E.C. 3 (Freight).

Holt & Co., Alfred: Head Office, India Buildings, Water St., Liverpool; London Agents, John Swire and Sons, 8 Billiter Square, E.C. 3; and Geo. Wills and Sons, Ltd. (for Australian Passenger Steamers only).

Houlder Brothers & Co., Ltd.: Head Office, 53, Leadenhall St., London, E.C. 3.

Houston Lines: Owners, R. P. Houston & Co., *q.v.*

Houston and Co., R. P.: Head Office, 10, Dale Street, Liverpool; London Office, 16, Leadenhall Street, E.C. 3.

Huddart, Parker, Ltd., 466, Collins St., Melbourne, and 101, Leadenhall St., London, E.C. 3.

Hull Steam Navigation Co., Ltd.: Managers, R. S. Dalgliesh, Ltd., *q.v.*

Indo-China Steam Navigation Co., Ltd., Hong Kong and 3, Lombard St., London, E.C. 3.

Instone & Co., Ltd., S., Baltic House, Docks, Cardiff, and 53, Leadenhall St., London, E.C. 3.

International Navigation Co., Ltd. (Branch of White Star Line): Head Office, 30, James Street, Liverpool; London Office, 1, Cockspur Street, S.W. 1.

"Janeta" Steamship Co., Ltd.: Owners, Maclay and McIntyre, *q.v.*

Java-China-Japan Lijn: Head Office, Prins Hendrikkade 34, Amsterdam, Holland; London Agents, Keller, Bryant and Co., 115-117, Cannon Street, E.C. 4.

Johnson, Axel Axelson, Stureplan 3, Stockholm, Sweden.

Johnson Line: Owners, Furness, Withy and Co., Ltd., *q.v.*

Johnston Line, Ltd.: Head Office, Royal Liver Building, Liverpool; London Office, 6, Billiter St., E.C.3.

Kawasaki Dockyard Co., Ltd., Kobe, Japan; and 48, Mark Lane, London, E.C. 3.

Kerr Steamship Co., Inc.: Head Office, New York; London Associated Company, R. S. Dalgliesh, Ltd., *q.v.*

Koninklijke Hollandsche Lloyd: Head Office, Oostelyke Handelskade, Amsterdam, Holland; London Agents, Wainwright Bros. and Co, 21, Fenchurch Street, E.C.3 (General); and D. H. Drakeford, 60, Haymarket, S.W. 1 (Passenger Agent).

Koninklijke Nederlandsche Stoomboot Maatschappij (Royal Netherlands Steamship Co.), Scheepvaarthuis, Prins Hendrikkade 108-114, Amsterdam, Holland.

Koninklijke Paketvaart Maatschappij (Royal Packet Navigation Co.), 112-114, Prins Hendrikkade, Amsterdam, Holland; London Agents, Keller, Bryant & Co., 115-117, Cannon Street, E.C. 3.

Koninklijke West-Indische Maildienst (Royal Netherlands West India Mail): Head Office, Prins Hendrikkade, 108-114, Amsterdam, Holland; London Agents, Phs. van Ommeren (London) Ltd., 27, Leadenhall, Street, E.C. 3.

Laird Line, Ltd.: Head Office, 52, Robertson Street, Glasgow; London Office, 29, Cockspur Street, S.W. 1.

Lamport & Holt, Ltd., Royal Liver Building, Pier Head, Liverpool; and 36, Lime Street, London, E.C. 3.

Lang & Fulton, Ltd.: Head Office, 1, Cathcart Street, Greenock; London Agents, James Foulton and Co., 3 and 4, Lime Street Square, E.C. 3.

Larrinaga & Co., Ltd.: Head Office, 30, James St., Liverpool; London Agents, Wainwright Bros. and Co., 21 Fenchurch Street, London, E.C. 3.

Leeds Shipping Co., Ltd.: Managing Owners, Sir W. R. Smith and Sons, Ltd., *q.v.*

Leith, Hull & Hamburg Steam Packet Co., Ltd., The: Managers, James Currie and Co., *q.v.*

Leyland and Co., Ltd., Frederick: Head Office, 27 and 29, James Street, Liverpool; London Offices, 38, Leadenhall Street, E.C.; and 1, Cockspur Street, S.W. 1.

Leyland Line: Owners, Frederick Leyland and Co., Ltd., *q.v.*

"Livingstonia" Steamship Co., Ltd.: Managing Owners, Maclay and McIntyre, *q.v.*

Lloyd Brazileiro, Cia. de Nav., 181, Avenida Rodrigues Alves, Rio de Janeiro, Brazil.

Lloyd Royal Belge (Great Britain), Ltd., 101, Leadenhall St., London, E.C. 3.

Lloyd Sabaudo, Società Anonima per Azioni: Head Office, Piazza della Meridiana, Genoa, Italy.

Lloyd Triestino, Società di Navigazione a Vapore: Head Office, Trieste, Italy; London Agents, Italian State Railways, Waterloo Place, Regent Street, S.W. 1 (Passengers); and Fisher, Alimarda and Co., Ltd., 110, Fenchurch Street, E.C. 3 (Freight).

"Lord" Line ("Head" Line and "Lord" Line): Managing Owners, G. Heyn and Sons, Ltd., *q.v.* *See also* "Head" Line.

MacAndrews & Co., Ltd.: Head Office, "Goree," Water Street, Liverpool; London Office, Suffolk House, Laurence Pountney Hill, E.C. 4.

MacBrayne, Ltd., David, 119, Hope St., Glasgow.

McIlwraith, McEacharn's Line (Proprietary), Ltd., Scottish House, 94-96, William St., Melbourne, Victoria, and Billiter Square Buildings, London, E.C.3.

Maclay & McIntyre, 21, Bothwell St., Glasgow.

"Magdala" Steamship Co., Ltd.: Managing Owners, Maclay and McIntyre, *q.v.*

Mallory Steamship Co.: Head Office, Pier 36, North River, New York, U S.A.

Manchester Liners, Ltd., Manchester Liners House, St. Anne's Square, Manchester.

Messageries Maritimes, Cie. des: Head Office, 9, Rue de Sèze, Paris (9); London Office, 72-75, Fenchurch St., E.C. 3.

Mitsui Bussan Kaisha, Ltd. (Mitsui & Co., Ltd.), 1, Nichome Honcho, Nihonbashi-Ku, Tokyo, Japan.

"Mombassa" Steamship Co., Ltd.: Managing Owners, Maclay and MacIntyre, *q.v.*

Moss & Co., H. E., 26, Chapel St., Liverpool, and 43, St. Mary Axe, London, E.C. 3.

Moss and Co., Ltd., James: Managers of Moss Steamship Co., Ltd., *q.v.*

Moss Steamship Co., Ltd.: Head Office, 31, James St., Liverpool; London Agents, Moxon, Salt and Co., Ltd., 101, Leadenhall Street, E.C. 3.

Navigazione Generale Italiana: Head Office, 6, Via Balbi, Genoa; London Agents, Italian State Railways, 12, Waterloo Place, Regent St., London, S.W. 1 (for Passengers); and Farina, Galliano, Brizzolesi and Co., 11, Bury Street, London, E.C. 3 (for Freights).

"Nederland" Stoomvaart Maatschappij. *See* Stoomvaart Maatschappij Nederland.

Nederlansch-Amerikaansche Stoomvaart-Maatschappij. *See* Holland-Amerika Lijn.

Nelson, Ltd., H. & W.: Head Office, 98, Leadenhall St., London, E.C. 3; Liverpool Office, 20, Water St.

Nelson Line (Liverpool) Ltd.: Owners, H. and W. Nelson, Ltd., *q.v.*

Nelson Steam Navigation Co., Ltd.: Owners, H. and W. Nelson, Ltd., *q.v.*

Neptune Line: Managers, Burton, Smart and Orford, Ltd., *q.v.*

New York & Cuba Mail Steamship Co. (Ward Line), Foot of Wall St., New York, U.S.A.

New York, Newfoundland and Halifax Steamship Co., Ltd.: Managers, C. T. Bowing and Co., Ltd., *q.v.*

New York & Porto Rico Steamship Co.: Head Office, 25, Broadway, New York, U.S.A.; London Agents, Harris and Dixon, Ltd., 81, Fenchurch St., E.C. 3.
New Zealand Shipping Co., Ltd., Maritime Buildings, Wellington, N.Z., and 138, Leadenhall St., London, E.C. 3.
Nippon Yusen Kabushiki Kaisha (Japan Mail Steamship Co., Ltd.), 1, Eirrakucho Itchome, Kojimachi-Ku, Tokyo Japan, and Coronation House, 4, Lloyd's Avenue, London, E.C. 3.
Nisshin Kisen Kabushiki Kaisha (Japan-China Steamship Co., Ltd.), 1, Yurakucho, 1 chome, Kojimachi-Ku, Tokyo, Japan.
Norddeutscher Lloyd, Bremen, Germany.
Nordenfjeldske Dampskibs-Selskab, Det, Trondhjem, Norway, and 353, Strand, London, W.C. 2.
Norske Amerika Linie A/S., Den, Lille Strandgate 1, Christiania Norway.
North Coast Steam Navigation Co., Ltd., 3, Sussex St. North, Sydney, N.S.W.
Northern Navigation Co., Ltd.: Managing Owners, Canada Steamship Lines, Ltd., *q.v.*
Oakwin Steamship Co., Ltd.: Managing Owners, Sir W. R. Smith and Sons, Ltd., *q.v.*
Ocean Steamship Co., Ltd.: Managers, Alfred Holt and Co., *q.v.*
Oceanic Steam Navigation Co., Ltd., Owners of White Star Line, *q.v.*
Oil Tank Steamship Co., Ltd.: Managers, C. T. Bowring and Co., Ltd., *q.v.*
Orient Line to Australia: Managers, Anderson, Green and Co., Ltd., *q.v.*
Osaka Shosen Kabushiki Kaisha, 64, Tomijimacho, Kitaku, Osaka, Japan.
Pacific Steam Navigation Co., Inc.: Head Office, Goree, Water St., Liverpool; London Office, 18, Moorgate St., E.C. 2.
Pacific Steamship Co., L. C. Smith Building, Seattle, U.S.A.
Pan American Petroleum & Transport Co.: Head Office, 1015, Security Building, Los Angeles Cal., U.S.A.: New York Office, 120, Broadway.
Panama Railroad Co., 24, State St., New York, U.S.A.
Pelton Steamship Co., Ltd.: Head Office, Milburn House, Newcastle-on-Tyne; London Office, 39, Lombard St., E.C. 3.
Peninsular & Oriental Steam Navigation Co., Inc., 122, Leadenhall St., London, E.C 3.
P. & O. Australia *viâ* the Cape Service, 32, Lime St., London, E.C. 3.
Petersen & Co., Ltd., 6, Lloyd's Avenue. London, E.C. 3
Petrograd Steamers, Ltd., Hull: London Agents, The United Shipping Co., Ltd., 108, Fenchurch St., E.C. 3.
Philadelphia Transatlantic Line: Owners, Furness, Withy & Co., Ltd., *q.v.*
Pinillos, Izquierdo & Co., Plaza San Augustin 2, Cadiz, Spain.
Pollock, Sons & Co., Ltd., Sir James, 3, Lloyd's Avenue, London, E.C. 3.
Pool Shipping Co., Ltd.: Managers, Sir A. Ropner & Co., Ltd., *q.v.*
Porto Rico Line: Managers, New York and Porto Rico Steamship Co., *q.v.*
Prince Line, Ltd., 56, Leadenhall St., London, E.C. 3.
Radcliffe & Co., Evan Thomas, Baltic House, Cardiff.
Raeburn & Vérel, Ltd., 45, West Nile Street, Glasgow.
Rederiaktiebolaget Transatlantic. *See* Transatlantic Steamship Co., Ltd.
Red Star Line (Société Anonyme de Navigation Belge-Américaine): Head Office, 22, Rue des Peignes, Antwerp; London Office, 1, Cockspur St., Westminster, S.W. 1.
Regis Shipping Co., Ltd : Managing Owners, Harrison, Sons & Co., Ltd., *q.v.*
Ridley, Son & Tully, John, Milburn House, Newcastle-on-Tyne.
Rio Cape Line, Ltd (Owners: Furness Withy, & Co. Ltd.), 56, Leadenhall St., London, E C. 3.
Robert Stanley Shipping Co., Ltd.: Managers, R. S. Dalgliesh, Ltd., *q.v.*
Robertson, Wm., 45, West Nile St., Glasgow.
Robinson, Brown & Co.: Head Office, Custom House Chambers, Newcastle-on-Tyne.
Ropner & Co., Ltd., Sir R.: Head Office, Mercantile Chambers, Mainsforth Terrace, West Hartlepool; London Office, 22, St. Mary Axe, E.C. 3; Cardiff Office, Exchange Buildings, Mount Stuart Square.
Ropner Shipping Co., Ltd.: Managers, Sir R. Ropner & Co., Ltd , *q.v.*
Rotterdam-South America Line (Rotterdam-Zuid Amerika Lijn): Managers, Van Nievelt, Goudriaan & Co.'s Stoomvaart Maatschappij, *q.v.*
Royal Mail Steam Packet Co.: Head Office, Royal Mail House, Moorgate, London, E.C. 2.
Runciman & Co., Ltd., Walter, Pilgrim Street, Newcastle-on-Tyne; London Office, 52–54, Leadenhall Street, London, E.C. 3.
Russian Volunteer Fleet, Ipatievsky pereulok 3, Moscow, Russia; London Agents Arcos, Ltd., Soviet House, 49, Moorgate, E.C. 2.
Ruys & Zonen, Wm., Veerhaven, 7, Rotterdam, Holland.

St. Just Steamship Co., Ltd.: Managing Owners, Sir W. R. Smith & Sons, Ltd., *q.v.*
Salvesen & Co., Ch.: Head Office, 29, Bernard St., Leith.
Scadia Lines: Managers, Burton, Smart & Orford, Ltd., *q.v.*
Shaw, Savill & Albion Co., Ltd.: Head Office, 34, Leadenhall St., London, E.C. 3.
Sheaf Steam Shipping Co., Ltd.: Managing Owners, W. A. Souter & Co., Ltd., *q.v.*
Shire Line: Owners, Thos. Law & Co., 123, Hope Street, Glasgow.
Smart's Continental Lines: Managers, Burton, Smart and Orford, Ltd., *q.v.*
Smith & Sons. Ltd., Sir William Reardon: Head Office, Merthyr House, James St., Cardiff; London Office, Billiter Buildings, 22, Billiter Street, E.C. 3.
Societa Italiana di Servizi Marittimi, Piazza Venezia 11, Rome, Italy.
Società di Navigazione "Sicilia": Head Office, Via del Giardino 76, Rome, Italy.
Société Anonyme de Navigation Belge Américaine. *See* Red Star Line.
Société Générale d'Armement, 1, Place Graslin, Nantes, France.
Société Générale de Transports Maritimes à Vapeur: Head Office, 5 Rue de Surène, Paris ($8^e$), France; London Agents, H. E. Moss & Co., 43, St. Mary Axe, E.C. 3.
Société "Les Affréteurs Réunis": Head Office, 15 Rue Scribe, Paris, France; London Office, Sussex House, 88A, Leadenhall St, E.C. 3.
Société Navale de l'Ouest: Head Office, 8, Rue Auber, Paris ($9^e$); London Agents, Langstaff, Ehrenberg and Pollak, Leadenhall Buildings, E.C. 3; and The Anglo-Guinea Produce Co., Ltd., 33-35, Eastcheap, E.C. 3.
Sota and Aznar: Head Office, Bilbao, Spain; London Office, 1, Lloyd's Avenue, E C. 3.
Souter & Co., Ltd., W. A.: Head Office, Akenside House, Akenside Hill, Newcastle-on-Tyne.
Southern Pacific Co., Atlantic Steamship Lines, 165, Broadway, New York, U S.A.
Stern, J. (Société des Affréteurs Réunis), 15, Rue Scribe, Paris.
Stockholms Rederiaktiebolag Svea., Skeppsbron 30, Stockholm, Sweden.
Stoomvaart Maatschappij "Nederland": Head Office, 108–114, Prins Hendrikkade, Amsterdam, Holland; London Agents, Keller, Bryant & Co., 115-117, Cannon St., E.C. 4 (General); and D. H. Drakeford, 60, Haymarket, S.W. 1 (Passenger).
Straits Steamship Co., Ltd., St. Helen's Court, Collyer Quay, Singapore.
Strick & Co., Ltd., Frank C., Baltic House, Leadenhall St., London, E C. 3.
Sun Shipping Co., Ltd.: Head Office, 3, St. Helen's Place, London, E.C. 2.
"T" Steam Coasters, Ltd.: Managers, Robinson, Brown & Co., *q.v.*
Tatsuuma Kisen Kabushiki Kaisha (Tatsuuma Steamship Co.), Nishinomiya, near Kobe, Japan.
Thomson & Co., William: Head Office, 28, Bernard St., Leith; London Agents, Killick, Martin & Co., 7, Fen Court, Fenchurch St., E.C. 3; and Galbraith, Pembroke & Co., 34, Leadenhall St., E.C. 3.
Town Line (London), Ltd.: Managing Owners, Harrison, Sons & Co., Ltd., *q.v.*
Town Line Shipping Co., Ltd.: Managing Owners, Harrison, Sons & Co., Ltd., *q.v.*
Toyo Kisen Kabushiki Kaisha (Oriental Steamship Co., Ltd.), No. 1, 1-chome Eirakucho, Kojimachi-Ku, Tokyo, Japan.
Transatlantic Steamship Co., Ltd.: Head Office, Gothenburg, Sweden; London Agents, J. E. Hyde, 1, Lime St. Square, E.C. 3.
"Transocèanic" Societa Italiana di Navigazione, Naples, Italy.
Transport Co., Ltd., 8-11, Lime St., London, E.C 3.
Turner, Brightman & Co., 8 & 9, Great St. Helens, London, E.C. 3.
Turner & Co.: Head Office, 45, St. Mary Axe, London, E.C. 3.
Ulster Steamship Co., Ltd.: Managing Owners, G. Heyn & Sons, Ltd., *q.v.*
Unér Aktiebolag, H., Norrköping, Sweden.
Union-Castle Line (Owners, The Union-Castle Mail Steamship Co., Ltd.): Head Office, 3, Fenchurch St., London, E.C. 3.
Union Steam Ship Co. of New Zealand, Ltd., Wellington, N.Z., and 138, Leadenhall St., London, E.C. 3.
United American Lines (Inc.): Head Office, 39, Broadway, New York, U.S.A.; London Agents, E. H. Mundy & Co., Port of London Building, Seething Lane, E.C. 3.
United States Lines, 45, Broadway, New York City, U.S.A.
United States Steel Products Co.: Head Office, 30, Church St., New York, U.S.A.; London Agents, Isthmian Steamship Co., Ltd., 138, Leadenhall St., E.C. 3.
United States Transport Co., Inc., 50, Broad St., New York, U.S A.
Van Nievelt, Goudriaan & Co.'s, Stoomvaart Maatschappij, N.V.: Veerhaven, 2, Rotterdam, Holland.
Van Ommeren (Phs.) Shipping Business, Ltd.: Head Office, Westerlaan 10, Rotterdam, Holland; London Office, Baltic House, 27, Leadenhall St., E.C. 3.
Virginia Line: Furness, Withy & Co., Ltd., *q.v.*
Walford Lines, Ltd.: Owners, Walford (London) Ltd., Leopold, *q.v.*
Walford (London) Ltd., Leopold: 29, Great St. Helens, London, E.C. 3.
Watergate Steam Shipping Co., Ltd.: Managers, R. S. Dalgliesh, Ltd., *q.v.*

Watts, Watts & Co., Ltd., 7, Whittington Avenue, Leadenhall St., London, E.C. 3.
Weir & Co., Andrew, Baltic Exchange Buildings, 19, 20, 21, Bury St., London, E.C. 3.
Westoll, James, 13, John St., Sunderland.
White Star-Dominion Line : Branch of White Star Line, *q.v.*
White Star Line : Head Office, 30, James St., Liverpool; London Office, 1, Cockspur St., Westminster, S.W. 1.
Wilhelmsen, Wilh., Christiania, Norway.
Wilson's and London and North-Eastern Railway Shipping Co., Ltd., Hull: London Agents, The United Shipping Co., Ltd., 108, Fenchurch St., E.C. 3.
Wilson Transit Co., 948, Kirby Building, Cleveland, Ohio, U S A.
Witherington & Everett, Exchange Buildings, Quayside, Newcastle-on-Tyne.
Ybarra & Co., Calle San Jose 5, Seville, Spain.
Yeoward Line, Harvey Buildings, 24 James Street, Liverpool.

# BRITISH SHIPBUILDERS, MARINE ENGINEERS AND REPAIRERS.

(s) Shipbuilders.
(m) Marine Engineers.
(d) Dry Dock Owners and Ship Repairers.

Abdela and Mitchell, Ltd., Isaac J. (s) (m): *Registered Offices*, 55, George Street, Manchester; *Works*, Brimscombe, Stroud, Glos., and Queensferry, Chester.
Aberdeen Harbour Commissioners (d): *Offices*, 16, Regent Quay, Aberdeen.
Aberdeen Trawl Owners' and Traders' Association (m): *Offices*, Albert Quay, Aberdeen.
Abernethy and Co., Ltd. (m): *Offices and Works*, Ferryhill Foundry, Aberdeen.
Ailsa Shipbuilding Co., Ltd. (s) (m) (d): *Head Office*, Troon; *Works*, Troon and Ayr.
Aitchison, Blair, Ltd. (m): *Offices and Works*, Whitecrook Engine Works, Clydebank, N.B.
Aldous, Ltd. (s): *Offices and Works*, Brightlingsea.
Alison and Co., Ltd., J. Gordon (d): *Offices*, Dock Engine Works, Birkenhead.
Allen, Sons, and Co., Ltd., W. H. (m): *Head Office and Works*, Queen's Engineering Works, Bedford; *London Office*, 5, Victoria Street, Westminster, S.W.1.
Alley and MacLellan, Ltd. (s) (m): *Head Offices and Works*, Sentinel Works, Polmadie, Glasgow; *London Office*, 32, Victoria Street, S.W.1.
Amble Shipbuilding Co., Ltd. (s): *Head Office and Works*, Hebburn-on-Tyne; *London Office*, 116, Fenchurch Street, E.C.3.
Amos and Smith, Ltd. (m) (d): *Head Office and Works*, Albert Dock Works, Hull.
Ardrossan Dry Dock and Shipbuilding Co., Ltd. (s) (d): *Head Office and Works*, Shipyard, Ardrossan, N.B.
Armstrong, Whitworth and Co., Ltd., Sir W. G. (s) (m): *Registered Office and Works*, Elswick Works, Newcastle-on-Tyne; *London Offices*, 8, Great George Street, S.W.1, and 38–39, Parliament Street, S.W.1 (Shipyard Department).
Austin and Son, Ltd., S. P. (s) (d): *Head Offices and Works*, Wear Dockyard, Sunderland.
Ayrshire Dockyard Co., Ltd. (s) (d): *Head Office and Works*, Shipyard, Irvine, Ayrshire.
Babcock and Wilcox, Ltd. (m), Glasgow; and Farringdon Street, London, E.C. 3.
Baggesen and Co. (m) (d): *Offices and Works*, Craigie Engine Works, Dundee.
Bailey, Graham and Co., Ltd., C. H. (d): *Offices*, Cardiff; *Docks*, Newport, Mon., and Cardiff.
Baird Bros. Ltd. (**m**): *Offices*, Bull Ring, North Shields.
Barclay, Curle and Co., Ltd. (s) (m) (d): *Head Offices*, Whiteinch; *Shipbuilding Yards*, Clydeholm, Whiteinch; and West Shipyard, Scotstoun; *Engine Works*, 36, Finnieston Street, Glasgow; *Boiler Works*, 90, Kelvinhaugh Street, Glasgow.
Barry Graving Dock and Engineering Co., Ltd. (d): *Offices*, Barry Dock, near Cardiff.
Bartram and Sons, Ltd. (s): *Offices and Shipyard*, South Dock, Sunderland.
Beardmore and Co., Ltd., W. (s) (m) (d): *Head Offices*, Parkhead Forge Rolling Mills and Steel Works, Glasgow; *Registered Office*, 36, Victoria Street, London, S.W. 1; *Shipyard and Engine Works*, Dalmuir.
Beazley, H. J. (s) (d): *Offices and Works*, Clausentum Yard, Northam Bridge, Southampton.
Belfast Harbour Commissioners (d): *Offices*, Corporation Square, Belfast.
Bell, Ltd., Hemsley (m): *Registered Office*, 2–4, William Street, Southampton; *London Office*, 116, Fenchurch Street, E.C.3.
Bergius Launch and Engine Co. (m): *Offices and Works* Glasgow.
Bickle Engineering Co., Ltd. (m) (d). *Offices*, G.W.R. Docks, Plymouth.
Blackett's Construction Co., Ltd. (s): *Offices*, Thornaby, Stockton.
Blair and Co., Ltd. (m): *Offices and Works*, Norton Road, Stockton-on-Tees.
Blumer, and Co., Ltd., John (s): *Offices and Works*, North Dock Shipyard, Sunderland.
Blyth Shipbuilding and Dry Dock Co., Ltd. (s) (m) (d): *Offices and Works*, Blyth, Northumberland.

Blythswood Shipbuilding Co., Ltd. (s): *Office and Works*, Blythswood Shipyard, South Street, Scotstoun, Glasgow.

Bow, McLachlan and Co., Ltd. (s) (M): *Head Office and Works*, Thistle Works, Paisley; *London Office*, 108, Fenchurch Street, London, E.C.3.

Braby and Co., Ltd., Frederick (s): *Offices*, Victoria Wharf, Grove Street, Deptford, London, S.E.8.

Brigham and Cowan (Hull) Ltd. (D): *Office*, Hedon Road, Hull.

Brigham and Cowan Ltd. (D): *Offices*, South Shields.

Bristol Corporation (D): *Head Office*, Queen's Square, Bristol.

British India Steam Navigation Co., Ltd. (D): *Head Offices*, 122, Leadenhall Street, London, E.C 3.

British Marine Motor and Launch Co , Ltd. (s) (M); *Head Offices*, Old Kirkpatrick, near Glasgow; *London Office*, 9, Billiter Square, E.C.3.

British Thomson-Houston Co. (M): *Head Offices and Works*, Rugby.

Brooke and Co., Ltd., J. W. (s) (M): *Offices*, Adrian Works, Lowestoft.

Brown and Co., George (s): *Offices and Works*, Garvel Shipyard, Greenock.

Brown and Co., John, Ltd. (s) (M): *Registered Offices*, Atlas Works, Savile Street, Sheffield; *Shipbuilding and Engineering Works*, Clydebank Shipyard, near Glasgow; *London Office*, 8, The Sanctuary, Westminster, S.W.1.

Brown's Shipbuilding and Dry Dock Co., Ltd. (s) (D): *Offices*, Lime Street, Hull.

Burntisland Shipbuilding Co., Ltd. (s): *Offices and Works*, Burntisland, Fife.

Burrell, William (M): *Offices and Works*, Victoria Works, Great Yarmouth.

Bute Shipbuilding, Engineering and Dry Dock Co., Ltd. (s) (D): *Offices*, Bute Dry Dock, Cardiff.

Caird and Co., Ltd. (s), Greenock. *See* Harland and Wolff, Greenock.

Caledon Shipbuilding and Engineering Co., Ltd. (s) (M): *Head Offices*, Lilybank Engine Works, Kemback Street, Dundee; *Shipyards*, Caledon Shipyard, and Stannergate Shipyard, Camperdown Street, Dundee; *London Office*, Billiter House, Billiter Street, E C.3.

Cammell Laird and Co., Ltd. (s) (M) (D): *Registered Office and Steel Works*, Sheffield; *Shipyards*, Birkenhead; *Carriage and Wagon Works*, Nottingham;: *London Office*, 3, Central Buildings, S.W.1.

Campbell and Calderwood, Ltd. (M): *Offices*, Murray Street, Paisley, N.B.

Campbeltown Shipbuilding Co., Ltd. (s): *Offices*, Campbeltown, N.B.

Camper and Nicholsons, Ltd. (s) (D): *Head Office*, Gosport; *Branch Office*, Southampton.

Cardiff Channel Dry Docks and Pontoon Co., Ltd. (D): *Offices*, Mount Stuart Square, Cardiff.

Carver and Son, Ltd., F. J. (D): *Offices*, Bridgwater.

Central Marine Engine Works (M): *Head Offices and Works*, West Hartlepool.

Chambers, Ltd., John (s) (M) (D): *Head Office*, Oulton Broad, Lowestoft.

Clark, Ltd., Geo. (M): *Offices and Works*, Southwick Engine Works, Sunderland.

Clelands (Ship Repairers) Ltd. (D): *Head Office and Works*, Willington Quay-on-Tyne.

Cleveland Shipbuilding Co., Ltd. (s) (D): *Head Offices*, Cleveland Dockyard, Middlesbrough-on-Tees: *London Offices*, 56, Victoria St., S.W.1.

Clover, Clayton and Co., Ltd. (D): *Managers*, H. and C. Grayson, Ltd.; *Head Offices*, Royal Liver Building, Liverpool; *Works*, Birkenhead.

Clyde Navigation, Trustees of the (D): *Offices*, 16, Robertson Street, Glasgow.

Clyde Shipbuilding and Engineering Co., Ltd. (s) (M) (D): *Head Offices*, Castle Works, Port Glasgow.

Coaster Construction Co., Ltd. (s): *Head Office*, 124, St. Vincent Street, Glasgow; *Shipyard*, Rossie Island, Montrose.

Cockrane and Sons, Ltd. (s): *Registered Office and Works*, Ouse Shipbuilding Yard, Selby, Yorks.

Connell, Chas. and Co., Ltd. (s): *Head Offices*, Scotstoun Shipbuilding Yard, Scotstoun, Glasgow.

Connell, Henry (D): *Offices and Shipyard*. Ousgate, Selby, Yorks.

Cook, Welton and Gemmell, Ltd. (s) (M): *Registered Office*, Grovehill, Beverley, Yorks.

Cooper and Greig, Ltd. (s): *Head Offices*, Britannia Works, East Dock Street, Dundee; *London Office*, 1, Fenchurch Avenue, E C. 3.

Cosens and Co., Ltd. (M) (D): *Head Office*, Custom House Quay, Weymouth.

Cox and Co. (Engineers), Ltd. (s) (M) (D): *Offices*, Falmouth.

Crabtree and Co . Ltd. (s) (M): *Offices and Works*, Southtown Works, Great Yarmouth.

Craig, Taylor and Co., Ltd. (s): *Head Offices*, Stockton-on-Tees.

Cramptons (Shipbuilders), Ltd. (s) (D): *Offices and Works*, Albion Shipyard, Mile End, Portsmouth.

Cran and Somerville, Ltd., John (s) (M) (D): *Head Offices*, Tower Street, Leith, Scotland; *Works*, Tower Street and Shore, Leith.

Crichton and Co., Ltd., J. (s) (m) (d): *London Offices*, 14, St. Mary Axe, E.C. 3; *Liverpool Offices*, Tower Buildings, Water Street; *Shipbuilding Yard*, Saltney Shipyard, Chester.

Crown and Sons, Ltd., John (s) (d): *Head Offices*, Strand Slipway, Sunderland.

Cumming, D. M. (s): *Offices and Works*, Glasgow.

Day, Summers and Co., Ltd. (s) (m) (d): *Head Offices*, Northam Iron Works, Southampton.

Denny and Brothers, Ltd., Wm. (s) (m): *London Offices*, 5, St. Helen's Place, E.C. 3; *Registered Offices*, Leven Shipyard, Dumbarton.

Deptford Dry Docks Co., Ltd. (d): *Offices*, Deptford, London, S.E.8.

Diamond and Co., Ltd., Thos. (d): *Offices and Works*, West Side, East Bute Docks, Cardiff.

Dibles (1918), Ltd. (s) (d): *Offices and Works*, Belvidere Shipyard, Southampton.

Dickinson and Sons, Ltd., J. (m): *Head Offices and Works*, Palmers' Hill Engine Works, Sunderland.

Dixon Bros. and Hutchinson, Ltd. (m): *Offices and Works*, Woolston, Southampton.

Dixon and Co., Ltd., Sir R. (s) (d): Middlesbrough-on-Tees; now incorporated in the Cleveland Shipbuilding Co., Ltd., *q.v.*

Dobson and Co., W. (s): *Head Offices*, Low Walker, Newcastle-on-Tyne.

Doig (Grimsby), Ltd., S. G. (d): *Offices and Works*, Fish Dock, Grimsby.

Douglas and Grant, Ltd. (m): *Head Offices*, Dunnikier Foundry, Kirkcaldy; *London Office*, Hastings House, Norfolk Street, Strand, W.C.2.

Doxford and Sons, Ltd., Wm. (s) (m): *Head Offices*, Pallion Yard, Sunderland; *Registered Offices*, Basildon House, Moorgate Street, London, E.C.2.

Dublin Dockyard Co., Ltd. (s) (d): *Offices*, Alexandra Basin, North Wall, Dublin.

Dublin Port and Docks Board (d): *Head Offices*, 19, 20, 21, Westmoreland Street, Dublin.

Dublin Shipbuilders, Ltd. (s) (m) (d): *Registered Office*, 39, Nassau Street, Dublin; *Works Office*, Ringsend Dockyard, Dublin; *Works*, Alexandra Road Shipyard, Dublin, and Ringsend Dockyard, Dublin.

Duncan and Co., Ltd., Robt. (s): *Offices and Shipyard*, Brown Street, Port Glasgow.

Dundee Harbour Trust (d): *Head Offices*, Harbour Chambers, Dundee.

Dundee Shipbuilding Co., Ltd. (s) (d): *Offices and Shipyard*, Panmere Shipyard, Dundee. (*In Liquidation.*)

Dunlop, Bremner and Co., Ltd. (s) (m): *Head Offices*, Inch Works, Port Glasgow.

Dunsmuir and Jackson, Ltd. (m): *Registered Offices*, Princes Street, Govan, Glasgow. (*In Liquidation.*)

Dunston, Ltd., Richard (s): *Offices*, Thorne, near Doncaster.

Duthie, Torry Shipbuilding Co., John (s): *Offices*, Torry, Aberdeen.

Earle's Shipbuilding and Engineering Co., Ltd. (s) (m) (d): *Head Offices*, Heden Road, Hull.

Edwards and Co., Ltd. (s): *Head Offices*, 240, West Ferry Road, Millwall, London, E.14.

Elliot and Jeffery (d): *Offices and Works*, Bute Docks, Cardiff.

Elliott and Garrood, Ltd. (m): *Head Offices and Works*, Ingate Iron Works, Beccles.

Eltringhams, Ltd. (s) (m) (d): *Head Offices*, Stone Quay Shipbuilding and Engineering Works, Willing Quay-on-Tyne; *London Office*, Bilboa House, New Broad Street, E.C.2; *Transfer Office*, Pinner's Hall, Austin Friars, London, E.C. 2.

Erimus Dock Co., Ltd. (d): *Registered Offices*, Court Chambers, Albert Road, Middlesbrough.

Fairfield Shipbuilding and Engineering Co., Ltd. (s) (m): *Head Offices*, Fairfield Shipbuilding and Engineering Works, Govan, Glasgow; *Registered Office*, 9, Victoria Street, London, S.W.1; *City Office*, 77, Gracechurch Street, E.C.3.

Falmouth Docks and Engineering Co., Ltd. (d): *Offices and Works*, Falmouth.

Fellows and Co., Ltd. (s) (d): *Offices*, Southtown Dry Docks, Great Yarmouth.

Ferguson Bros. (Port Glasgow), Ltd. (s) (m): *Offices*, Port Glasgow.

Fleming and Ferguson, Ltd. (s) (m): *Head Offices*, Phœnix Works, Merksworth, Paisley; *London Offices*, 91, Victoria Street, S.W.1.

Fletcher, Son and Fearnall, Ltd. (d): *Offices*, Union Docks, Limehouse, London, E.14.

Flett, Carson and Co., Ltd. (d): *Offices*, 194, Finnieston Street, Glasgow.

Forbes, J. and G. (s) (d): *Offices*, Sandhaven, near Fraserburg, Scotland.

Forth Shipbuilding and Engineering Co. (1921), Ltd. (s) (m): *London Offices*, Vickers House, Broadway, Westminster, S.W.1; *Shipyards*, Forth Yard, Forthbank Yard, and Jeffrey Yard, Alloa, Scotland; *Boiler Works*, Moore Park, Govan, Glasgow.

Fraser and Chalmers Engineering Works (m): *Proprietors*, The General Electric Co., Ltd.; *London Offices*, Magnet House, Kingsway, W.C.2: *Works*, Erith, Kent.

Fullerton and Co., John (s): *Head Office*, Merksworth Building Yard, Paisley.
Furness Shipbuilding Co., Ltd. (s): *Offices*, Haverton Hill-on-Tees.
Gauldie, Gillespie and Co., Ltd. (m): *Offices*, Broomhall Engine Works, Kinning Park, Glasgow.
Goole, Aire and Calder Navigation (d): *Head Offices*, Leeds; *Docks*, Goole.
Goole Shipbuilding and Repairing Co., Ltd. (s) (d): *Head Offices*, Goole.
Grangemouth Dockyard Co., Ltd. (s) (d): *Offices and Works*, Canal Street, Grangemouth.
Gray and Co., Ltd., Wm. (s) (d): *Head Offices*, West Hartlepool.
Grayson, Ltd., H. and C. (s) (d): *Head Offices*, Royal Liver Building, Liverpool; *Works at* Liverpool, Garston, Birkenhead, and Holyhead.
Great Western Railway (d): *Head Office*, Paddington Station, London, W.2.
Green and Silley Weir, Ltd., R. and H. (d): *Registered Offices*, Cory Buildings, Fenchurch Street, London, E.C.3; *General Office*, Blackwall, London, E.14.
Greenock Dockyard Co., Ltd. (s) (d): *Head Offices and Shipyard*, Main Street, Greenock.
Greenock Harbour Trust (d): *Offices*, Greenock.
Greenwell and Co., Ltd., T. W. (d): *Registered Offices*, Graving Dock Repair Works, South Dock, Sunderland.
Grey and Co., Ltd., Geo. T. (m): *Offices and Works*, Holborn Engineering Works, South Shields.
Hall and Co., Ltd., Alexander (s) (m): *Offices and Works*, 40, York Street, Aberdeen.
Hall, Russell and Co., Ltd. (s) (m) (d): *Head Offices and Works*, Aberdeen Iron Works, York Place, Aberdeen.
Hansen Shipbuilding and Repairing Co., Ltd. (s) (d): *Offices*, Cleve Houses, Bideford.
Harkness and Son, Ltd., W. (s) (d): Middlesbrough-on-Tees. Now Incorporated in the Cleveland Shipbuilding Co., Ltd., *q.v.*
Harland and Wolff, Ltd. (s) (m) (d): *Offices, Shipyard and Engine Works*, Queen's Island, Belfast; *Engineering and Repairing Works at* Liverpool, London, and Southampton; *Shipyards at* Govan and Greenock, Scotland; *Engine Works at* Finnieston, Glasgow; Scotstoun, Glasgow; and Clyde Factory, Govan; *London Offices*, 1a, Cockspur Street, S.W 1.
Harris Bros., Ltd. (d); *Offices and Works*, Cambrian Dry Docks, Swansea.
Harvey Shipbuilding Co., Ltd. (s) (d): *Offices and Works*, Littlehampton.
Hawthorn, Leslie, and Co., Ltd., R. and W. (s) (m) (d): *Registered Offices and Works*, St. Peter's Works, Newcastle-on-Tyne; *London Offices*, 3a. Dean's Yard, Westminster, S.W.1, and Exchange Chambers, St. Mary Axe, E.C.3.
Hawthorns and Co., Ltd. (s) (m): *Registered Offices and Works*, Leith Engine Works, Leith; *Shipyard*, Victoria Shipyard, Leith; *London Office*, Grand Trunk Building, 17-19, Cockspur Street, S.W.1; *Liverpool Office*, 229, Tower Building.
Hayes, Ltd., Edward (s) (m): *Works and Offices*, Stony Stratford.
Henderson and Co., Ltd., D. and W. (s) (m) (d): *Head Offices and Shipyard* Meadowside Docks and Shipbuilding Yards, Partick, Glasgow; *Engine Works*, 190, Elliot Street, Glasgow.
Hepples (1919), Ltd. (s) (m) (d): *Offices and Works*, Wapping Street, South Shields.
Herd and MacKenzie (s) (d): *Offices*, Buckie and Findochty, Banff.
Hill and Sons, Ltd., Charles (s) (d): *Offices*, Albion Dockyard, Cumberland Road, Bristol.
Hills' Dry Docks and Engineering Co., Ltd. (d): *Offices*, East Bute Dockard, Cardiff.
Holman and Sons, Ltd., N. (d): *Offices*, Penzance; *Works*, Penzance and St. Just, Cornwall.
Holmes and Co., Ltd., Charles D. (m): *Offices and Works*, Alfred Street, Hull.
Hull Central Dry Dock and Engineering Works, Ltd. (d): *Offices*, Humber Street, Hull.
Humber Graving Dock and Engineering Co , Ltd. (d): *Registered Offices and Works*, King's Dock, Immingham.
Hutsons, Ltd. (m): *Offices*, Kelvinhaugh Engine Works, Kelvinhaugh Street, Glasgow.
Inglis, Ltd., A. and J. (s) (m) (d): *Engine Works*, 64, Warroch Street, Glasgow; *Shipyard*, Pointhouse Shipyard, Glasgow.
Irvin and Sons, Ltd., Richard (s) (d): *Offices*, 8, Bridge Street, Peterhead.
Irvine's Shipbuilding and Dry Docks Co., Ltd. (s) (d); *Head Offices*, Middleton Shipyard, West Hartlepool; *Transfer Office*, 37/41, Gracechurch Street, London, E.C.3.
Jefferies and Sons, Ltd. J. (m) (d): *Offices*, 116, Fenchurch Street, London, E.C.3.
Kemp and Co., Ltd., R. (s) (d): *Offices*, The Shipyard, Hythe, Southampton.
Khedivial Mail Steamship and Graving Dock Co , Ltd. (d): *Registered Offices*, 122, Leadenhall Street, London, E.C.3.
Kincaid and Co., Ltd., J G. (m): *Offices and Works*, East Hamilton Street; and Arthur Street, Greenock, Scotland.

King's Lynn Slipway Co., Ltd. (s) (d): *Offices*, West Lynn Shipyard, King's Lynn.
Laing and Sons, Ltd., Sir James (s) (d): *Head Offices*, Deptford Yard, Sunderland.
Leith Harbour and Dock Commissioners (d): *Offices*, Tower Place, Leith.
Lester and Perkins, Ltd. (d): *Head Offices and Works*, Royal Albert Dry Docks, London, E.16.
Lewis and Sons, Ltd., John (s) (m) (d): *Offices*, Albert Quay, Aberdeen.
Lithgows, Ltd. (s) (d): *Head Offices*, Kingston Shipbuilding Yard, Port Glasgow
Livingstone and Cooper, Ltd. (s): *Registered Office and Works*, Hessle, Hull.
Lloyd Royal Belge (Gt. Britain), Ltd. (s) (*Late* Brys and Gylsen, Ltd.): *Head Offices*, 101, Leadenhall Street, London, E.C.3.
Lobnitz and Co., Ltd. (s) (m): *Head Offices*, Renfrew, Scotland.
London and Glasgow Engineering and Iron Shipbuilding Co., Ltd. (s) (m), Glasgow. *See* Harland and Wolff, Ltd.
London Graving Dock Co., Ltd. (d): *Offices*, 110, Fenchurch Street, London, E.C.3.
London, Midland, and Scottish Railway (d): *Head Offices*, Euston Station, London, N.W.1.
London and Montrose Shipbuilding and Repairing Co., Ltd. (s) (d): *Head Offices and Works*, The Shipyard, Montrose; *London Offices*, 26–28, Billiter Street, E.C.3.
London and North Eastern Railway (d): *Chief General Manager*, King's Cross Station, London, N.1.; *Dry Docks at* Grimsby, Lowestoft, and Hull.
Londonderry Port and Harbour Commissioners (d): *Offices*, Londonderry.
McAlister and Son, R. (s): *Offices*, Sandpoint, Dumbarton.
MacColl and Co., Ltd. (s) (m): *Head Offices*, Queen's Road, Belfast.
MacColl and Pollock, Ltd. (m): *Head Offices*, Wreath Quay Engineering Works, Sunderland.
McKie and Baxter (m): *Offices and Works*, Copland Works, Govan, Glasgow.
McMillan and Son, Ltd., Archibald (s): *Head Offices*, Dockyard, Dumbarton.
McNicoll Brothers (s) (d): *Offices and Works*, Kelvin Dock, Maryhill, Glasgow.
Manchester Dry Docks Co., Ltd. (s) (d): *Head Office*, Mode Wheel, Manchester.
Medway Slipway Co. (d): *Offices*, Rochester, Kent.
Menzies and Co., Ltd. (m) (d): *Offices and Works*, Leith.
Mercantile Dry Dock Co., Ltd. (d): *Offices and Works*, Jarrow-on-Tyne.
Mercantile Pontoon Co., Ltd. (d): *Head Offices*, Roath Dock, Cardiff.
Mersey Docks and Harbour Board (d): *Head Offices*, Dock Office, Liverpool.
Metropolitan-Vickers Electrical Co., Ltd. (m): *Head Offices and Works*, Trafford Park, Manchester.
Middle Docks and Engineering Co., Ltd. (d): *Head Offices and Works*, Middle Docks, South Shields.
Mildway Shipbuilding and Engineering Co. (s) (m): *Registered Offices*, Rochester, Kent.
Milford Docks Co. (d): *Offices*, 16, Victoria Street, London, S.W.1.
Mills and Knight, Ltd. (d): *Offices*, 155, Fenchurch Street, London, E.C.3.
Ministry of Transport (d): *Offices*, Whitehall Gardens, London, S.W.1.
Mistley Shipbuilding and Repairing Co. (s) (d): *Offices*, The Quay, Mistley, Essex.
Mitchison, Ltd., T. (m) (d): *Offices*, Friars Goose Slipway, Gateshead.
Monmouth Shipbuilding Co., Ltd. (s): *Head Offices and Works*, Chepstow, Mon.; *Registered Office*, Basildon House, Moorgate Street, London, E.C.2; *London Office*, 77, Gracechurch Street, E.C.3.
Morris, J. and D. (s) (d): *Offices and Works*, Pelawmain-on-Tyne. (*In Liquidation.*)
Mumford, Ltd., A. G. (m): *Head Offices and Works*, Culver Street Engineering Works, Colchester; *London Office*, 52, Queen Victoria Street, E.C.4.
Murdock and Murray, Ltd. (s): *Head Offices*, Port Glasgow.
Napier and Miller, Ltd. (s) (m): *Head Offices*, Old Kirkpatrick, nr. Glasgow.
Noble and Co., Wilson (s): *Offices and Works*, Fraserburgh.
North British Diesel Engine Works (1922), Ltd. (m): *Offices and Works*, Whiteinch, Glasgow.
North Eastern Marine Engineering Co., Ltd. (m): *Head Offices*, Wallsend-on-Tyne; *Works at* Wallsend-on-Tyne and Sunderland; *London Offices*, 22, Billiter Street, E.C.3; *Liverpool Office*, 529, Tower Building.
North of Ireland Shipbuilding Co., Ltd. (s) (d): *Head Offices and Works*, Londonderry; *London Office*, 21, Russell Square, W.C.1; *Liverpool Office*, 630, Royal Liver Building.
Northumberland Shipbuilding Co., Ltd. (s): *Head Offices*, Howdon-on-Tyne, Willington Quay, R.S.O.; *Registered Offices*, Basildon House, Moorgate Street, London, E.C.2.
Ocean Dry Docks Co., Ltd. (d): *Offices*, Central Drydocks, Swansea.
Osbourne, Graham and Co., Ltd. (s) (d): *Head Offices*, Hylton, nr. Sunderland.

Ouse Shipbuilding and Engineering Co., Ltd. (s): *Offices*, Hook, near Goole.

Palmers Shipbuilding and Iron Co., Ltd. (s) (m) (d); *Registered Offices*, Jarrow-on-Tyne: *Works*, Jarrow-on-Tyne and Hebburn-on-Tyne; *London Office*, 116, Fenchurch Street, E C.3.

Parsons Marine Steam Turbine Co., Ltd. (m): *Registered Offices and Works*, Turbinia Works, Wallsend-on-Tyne; *London Offices*, 56, Victoria Street, S.W.1.

Penarth Pontoon, Slipway and Ship Repairing Co., Ltd. (d): *Offices and Works*, Penarth Dock, near Cardiff.

Philip and Son, Ltd. (s) (m) (d): *Offices*, Sandquay, Dartmouth.

Pickersgill and Sons, Ltd., William (s): *Registered Offices and Shipyard*, Southwick, Sunderland.

Pitchers, Ltd. (s): *Offices*, North Quay, Great Yarmouth.

Plenty and Son, Ltd (m): *Offices and Works*, Eagle Iron Works, Newbury, Berks.

Pollock, Sons and Co., Ltd., James (s) (m): *Registered Offices*, 3, Lloyd's Avenue, E.C.3; *Liverpool Office*, 224, Royal Liver Building; *Shipyard*, Faversham.

Ponsharden Shipyard (s) (m) (d): *Offices and Works*, Ponsharden Shipyard, Falmouth; *Branches*, Southampton, Exeter, and Topsham.

Port of London Authority (d): *Head Offices*, Trinity House, London, E.C.3

Priestman and Co., Sir John (s): *Offices and Shipyard*, Southwick, Sunderland.

Prince of Wales Drydock Co. (Swansea). Ltd. (d): *Head Offices and Works*, Swansea: *London Office*, 34, Great St. Helens', E.C.3.

Queenstown Dry Docks, Shipbuilding and Engineering Co., Ltd. (s) (m) (d): *Head Offices*, Passage West, County Cork, Ireland; *Registered Offices*, Furness House, Leadenhall Street, London, E C.3.

Ramage and Ferguson, Ltd. (s) (m): *Offices and Works*, West Pier, Leith.

Rankin and Blackmore, Ltd. (m): *Offices and Works*, Eagle Foundry, Baker Street, Greenock.

Readhead and Sons, Ltd., John (s) (m) (d): *Offices and Works*, West Docks, South Shields.

Rennoldson and Co., Charles (s): *Offices*, The Lawe Shipyard, South Shields.

Rennoldson and Sons, Ltd., J. P. (s) (m) (d): *Offices and Works*, South Shields.

Richardson, Duck and Co., Ltd. (s): *Offices and Works*, South Stockton Shipyard, Stockton-on-Tees.

Richardsons, Westgarth and Co., Ltd (m): *Registered Office*, Hartlepool; *Works at* Hartlepool, Middlesbrough, and Sunderland; *Branch Offices* at London, Middlesbrough, and Sunderland.

Ritson's Shipbuilding and Engineering Co., Ltd. (s) (m) (d): *Registered Offices*, Greenland Road, Blyth, Northumberland.

River Wear Commissioners (d): *Offices*, St. Thomas Street, Sunderland.

Robb, Ltd., Henry (s) (d): *Registered Offices*, 18, Bernard Street, Leith; *Works*, Edinburgh Works, Albert Road, Leith.

Robey and Co., Ltd. (m): *Offices and Works*, Lincoln.

Rogers and Co. (Shipbuilders), Ltd. (s) (m): *Offices and Works*, Cremyll, Plymouth.

Rogers, Ltd., John (d): *Offices*, East Dock, Cardiff.

Rollo and Sons, Ltd., David (m): *Registered Offices*, 33-41, Sandhills Lane, Liverpool; *Works*. 9, Blackstone Street, Liverpool.

Ropner Shipbuilding and Repairing Co. (Stockton), Ltd. (s) (d): *Offices and Works*, North Shore Shipbuilding Yard, Stockton-on-Tees.

Rose Street Foundry and Engineering Co., Ltd. (s) (m) (d): *Offices*, 2, Rose Street, Inverness.

Ross and Duncan (m): *Offices and Works*, Whiteinch Works, Govan, Glasgow.

Ross and Walpole, Ltd. (m): *Offices and Works*, 65–68, North Wall, Quay, Dublin.

Rowan and Co., Ltd., David (m): *Head Offices*, 231, Elliot Street, Glasgow.

Rowhedge Ironworks Co., Ltd. (s) (m): *Registered Offices*, Rowhedge, near Colchester.

Rutherford and Co., Ltd., A. (s) (m): *Head Offices and Works*, Neptune Works, Bridge Street, Birkenhead.

Salter Bros., Ltd. (s): *Offices and Works*, Folly Bridge, Oxford.

Salterns, Ltd. (s) (d): *Registered Offices*, Parkstone, Poole Harbour, Dorset. (*In Liquidation.*)

Sandford, Ltd., E. A. and H. (m): *Offices*, Thames Iron Works, Gravesend.

Scarr, Ltd., Henry (s) (m): *Head Offices*, Haven Shipyard, Hessle, Yorks.

Scarr and Sons, Ltd., Joseph (s): *Head Office*, Grove Hill, Beverley.

Scarr, T. H. (s) (d): *Offices and Works*, Howden. Yorks.

Scott, D. and R. B. (m): *Offices and Works*, Abertay Works, Tayport.

Scott and Sons (s) (d): *Offices and Works*, Bowling, near Glasgow.

Scotts' Shipbuilding and Engineering Co., Ltd. (s) (m) (d): *Registered Offices and Engine Works*, Greenock Foundry, East Stewart Street, Greenock; *Shipyards*, Cartsdyke, Greenock; Cartsburn Dockyard, Greenock; *Sawmills*, Cartsdyke Saw Mills, Greenock; *London Offices*, 22, Billiter Street, E.C.3.

Seath and Co., T. B. (s): *Offices*, 121, St. Vincent Street, Glasgow.

Sharpness New Docks and Gloucester and Birmingham Navigation Co. (d): *Head Offices*, Dock Office, Gloucester.

Shields Engineering and Dry Dock Co., Ltd. (m) (d): *Offices*, North Shields.

Short Bros., Ltd. (s): *Head Offices and Shipyard*, Pallion, Sunderland; *Branch Offices*, 58, John Street, Sunderland.

Short Bros. (Rochester and Bedford), Ltd. (s): *Registered Offices*, Whitehall House, 29/30, Charing Cross, London, S.W.1; *Works*, Rochester, Kent.

Simons and Co., Ltd., Wm.: *Registered Offices*, London Works, Renfrew; *London Offices*, 83, Victoria Street, S.W.1.

Sisson and Co., Ltd., W. (m): *Offices and Works*, Elmbridge Road, Gloucester.

Smith, Ltd., Geo. and Thos. (s): *Head Offices and Works*, Rye, Sussex.

Smith's Dock Co., Ltd. (s) (m) (d): *Head Office*, High Docks, South Shields.

Southern Railway (South Western Section) (d): *Head Offices*, Waterloo Station, London, S.E.1; *Dry Docks*, Southampton.

Stephen and Sons, Ltd., Alexander (s) (m) (d): *Head Offices*, Shipbuilding Yard and Engineering Works, Linthouse, Govan, Glasgow; *Repair Works*, Govan Dry Docks Repair Works, Govan, Glasgow.

Stevenson and Asher (s) (m): *Offices and Works*, Banff.

Stothert and Co., Ltd., G. K. (s) (m) (d): *Head Offices and Works*, Steamship Works, Bristol.

Stow and Son (s) (d): *Offices*, Shoreham.

Sunderland Shipbuilding Co., Ltd. (s): *Head Offices and Shipyard*, South Dock, Sunderland.

Sulzer Bros., Ltd. (m): *Registered Offices*, 31, Bedford Square, London, W.C.1; *Works*, Winterthur, Switzerland; Manchester and Swansea.

Swan, Hunter and Wigham Richardson, Ltd. (s) (m) (d): *Registered and Head Office*, Wallsend Shipyard, Wallsend-on-Tyne; *London Offices*, 21, Russell Square, W.C.1, and 4, Fenchurch Avenue, E C.3; *Liverpool Office*, Royal Liver Building; *Shipyards*, Newcastle-on-Tyne, Wallsend-on-Tyne, and Southwick, Sunderland.

Taw Shipyards, Ltd. (s): *Head Offices*, 39, Victoria Street, London, S.W.1; *Shipyard*, Barnstaple, North Devon.

Thompson and Sons, Ltd., Joseph L. (s) (d): *Head Offices and Works*, North Sands Shipbuilding Yard and Manor Quay Repairing Works, Sunderland.

Thompson and Sons, Ltd., R. (s) (d): *Registered Offices and Shipyard*, Southwick Yard, Sunderland.

Thornycroft and Co., Ltd., Sir J. I. (s) (m) (d): *Head Offices*, Thornycroft House, Smith Square, London, S.W.1; *Shipyards*, Woolston Works, Southampton; *Motor Vehicle and Marine Engineering Works*, Basingstoke, Hants.

Tyne Iron Shipbuilding Co., Ltd. (s): *Head Offices*, Willington Quay-on-Tyne.

Vickers, Ltd. (s) (m) (d): *Registered and Transfer Office*, Vickers House, Broadway, London, S.W.1; *General Works*, River Don Works, Sheffield; *Naval Construction Works*, Barrow-in Furness; *Ordnance Works*, Erith, Kent; *Dartford Works*, Dartford, Kent; *Crayford Works*, Crayford, Kent; *Weybridge Works*, Weybridge, Surrey; *Cardiff Offices*, Principality Buildings, Queen Street.

Vickers (Ireland) Ltd. (Dublin Dockyard Co.), (s) (d): *Registered Offices*, 32, Nassau Street, Dublin; *Works*, Dublin Dockyard, Alexandra Basin, North Wall, Dublin.

Vickers-Petters, Ltd. (m): *Offices and Works*, Ipswich.

Walker and Co., Ltd., C H. (s). *Offices*, Sudbrook, Chepstow.

Wallsend Slipway and Engineering Co., Ltd. (s) (d): *Head Offices*, Wallsend-on-Tyne: *London Offices*, 30, Great St. Helens, E.C.3.

Warrenpoint Shipbuilding and Engineering Co., Ltd. (s) (d): *Registered Offices*, 49, St. James' Street, London, S.W. 1; *Shipyard*, Warrenpoint, Co. Down, Ireland.

Watson (Gainsborough), Ltd., J. S. (s): *Offices*, Gainsborough.

Weir, Ltd., G. and J. (m): *Head Offices and Works*, Cathcart, Glasgow.

White and Co., Ltd., J. Samuel (s) (m) (d): *Head Offices*, East Cowes, Isle of Wight; *London Offices*, 28, Victoria Street, S.W.1; *Liverpool Offices*, 707–711, Royal Liver Building.

Wood, Skinner and Co., Ltd. (s): *Registered Offices and Works*, Shipyard, Bill Quay, Newcastle-on-Tyne.

Workman, Clark and Co., Ltd. (s) (m): *Head Offices*, Spencer Basin, Belfast: *Works*, North Yard, Spencer Basin; South Yard, Queen's Road; and Engineering Works, Queen's Road; Belfast.

Yarrow and Co. (1922), Ltd. (s) (m): *Head Offices and Works*, Scotstoun, Glasgow.

# COLONIAL AND FOREIGN SHIPBUILDERS, MARINE ENGINEERS, AND REPAIRERS.

(s) Shipbuilders. (m) Marine Engineers. (d) Dry Dock Owners.

Akers Mek. Verksted, A/S (s) (m) (d): *Offices*, Dokveien 3–5, Christiania, Norway.
Alblasserdamsche Machinefabriek (m): *Offices*, Alblasserdam, Holland.
Alexander Brothers (m): *Offices*, Barcelona, Spain.
Allgemeine Electricitäts Gesellschaft (m): *Offices*, Berlin, Germany.
American Shipbuilding Co. (s) (d): *Offices*, Foot of 54th Street, Cleveland, O., U.S.A.; *Works*, Cleveland, O.; and Lorain, O., U.S.A.
Amsterdam Drydock Co. (Amsterdamsche Droogdok Maatschappij) (d); *Offices*, Amsterdam, Holland.
Ansaldo, G. and Co. (s): *Works*, Sestri Ponente and Sampierdarena, Italy.
Ansaldo, San Giorgio. *See* Società Anonima Fiat.
Antwerp Engineering Co., Ltd. (Société Anon.) (s) (m) (d): *Offices*, Rue des Indes, Antwerp, Belgium; and 22, St. Mary Axe, London, E.C. 3.
Arnhemsche Stoomsleephelling Maatschappij (s) (m) (d): *Head Offices*, Stadsblokkenweg 37B, Arnhem, Holland.
Arsenale di Taranto (s): *Offices*, Taranto, Italy.
Asano Shipyard (s): *Offices*, Tsurumi, near Tokyo, Japan.
Ateliers et Chantiers de Bretagne (s) (m): *Head Office*, Prairie-au-Duc, Nantes; *Paris Offices*, 53 Rue Vivienne.
Ateliers et Chantiers de la Loire (s) (m): *Offices*, 11 bis, Boulevard Haussmann, Paris.
Ateliers et Chantiers Maritimes du Sud-Ouest (s): *Head Offices*, 73, Boulevard Haussmann; *Works*, Bordeaux.
Atlantic Coast Co. (s): *Offices*, Thomaston, Me., U.S.A.
Atlas Diesel Aktiebolaget (m): *Offices*, Torsgatan 5, Stockholm; *Works*, Sickla, Sweden.
Atlas Engineering Co., Ltd. (Aktieselskabet Atlas Maskinfabrik) (m): *Registered Offices*, Copenhagen, Denmark.
Atlas Werke Aktiengesellschaft (s) (m): *Offices and Works*, Bremen, Germany.
Augsburg-Nürnberg Motorfabrik (m): *Offices and Works*, Nürnberg, Germany.
"Baanhoek," Voorheen T. Nederlof, N. V. Scheepsbouwwerf (s): *Registered Offices*, Sliedrecht, Holland; *London Offices*, 47, Victoria, Street, S.W. 1.
Bacini and Scali Napoletani (m): *Offices and Works*, Naples, Italy.
Bailey and Co., Ltd., W. S. (s) (m): *Offices*, *Works*, *and Shipyard*, Kowloon Bay, Hong Kong.
Baltimore Dry Docks and Shipbuilding Co. (s) (m): *Offices and Works*, Baltimore, U.S.A.
Bath Iron Works (s) (m) (d): *Offices and Works*, Bath, Me., U.S.A.
Bergens Mekaniske Verksted, A/S (s) (m) (d): *Offices and Works*, Bergen, Norway.
Bergsunde Mek. Verkstads Aktiebolaget (s) (m) (d): *Head Offices and Works*, Stockholm, Sweden.
Bethlehem Shipbuilding Corporation, Ltd. (s) (m) (d): *Offices*, Bethlehem, Pa., U.S.A.; *General Sales Offices*, 25, Broadway, New York City, U.S.A.
Blohm und Voss, Kommanditgesselschaft (s) (m) (d): *Head Offices*, Hamburg, Germany.
Boele's Shipbuilding Co. (Boele's Scheepswerven en Machinefabriek) (s) (m): *Offices*, Bolnes; *Works*, Bolnes and Slikkerveer, Holland.
Bolnes Machinefabriek (m): *Offices and Works*, Bolnes, Holland.
Bonn and Mees (s): *Head Offices and Shipyard*, Maashaven, W.Z., Rotterdam, Holland.
Borsig, A. (s): *Offices and Works*, Berlin-Tegel, Germany.
Bretagne, Ateliers et Chantiers de. *See* Ateliers, etc.
Brokeroens Skibsbyggeri (s): *Offices and Works*, Svelvik, Norway.
Brossard, Mopin and Co. (s): *Offices and Works*, Hsin Ho, China.
Burgerhout's Shipbuilding and Engineering Co., Ltd. (Burgerhout's Machinefabriek en Scheepswerf) (s) (m) (d): *Head Offices*, Rotterdam, Holland; *London Representatives*, Rowland Willis & Co., 12, St. Mary Axe, E.C.3.

Burmeister and Wain, Ltd. (Aktieselskabet Burmeister and Wain's Maskin-og Skibsbyggeri) (s) (m) (d): *Head Offices*, Copenhagen, Denmark: *London Offices*, 17/19, Cockspur Street, S.W.1.; *Glasgow Offices*, 29, Waterloo Street.
Burn and Co., Ltd. (s) (m) (d): *Registered Offices*, 7, Hastings Street, Calcutta; *Works*, Howrah Ironworks, Howrah, Bengal, India.
Caillard et Cie (s), Le Havre, France.
Canadian Allis-Chalmers (s): *Offices and Works*, Bridgeburg, Ont., Canada.
Canadian Ingersoll-Rand Co. (s): *Offices and Works*, Sherbrooke, Quebec, Canada.
Canadian-Vickers, Ltd. (s) (d): *Head Offices*, Montreal, Canada.
Cantiere Federaleper Costruzioni Navali (s): *Registered Offices*, 2, Via San Giorgio, Genoa, Italy.
Cantiere Navale Triestino (s) (m) (d): *Registered Offices*, Monfalcone; *Branch Offices*, 10, Via Milano, Triest, Italy.
Cantiere San Rocco S. A. (s): *Offices*, San Rocco, near Triest, Italy.
Cantieri Cersusa: *Offices and Works*, Voltri, Italy.
Cantieri Navali Riuniti (s) (m) (d): *Central Offices*, Via Balbi 4, Genoa, Italy.
Castellamare Royal Dockyard (s): *Offices and Works*, Castellamare, Italy.
Chantiers de France: *Offices and Works*, Dunkirk, France.
Chantiers et Ateliers Augustin Normand (s) (m): *Offices*, Rue du Perrey 67, Havre, France.
Chantiers Navals Belges (s): *Offices and Works*, Cruybeke, Belgium.
Chantiers Navals Français (s) (d): *Registered Offices*, Rue de Mogador, 33, Paris, France.
Chickasaw Shipbuilding Co. (s): *Offices and Works*, Mobile, Ala., U.S.A.
Christensen, H. C. (s): *Offices and Works*, Marstal, Denmark.
Christiansands Mekaniske Voerksted (s): *Offices and Works*, Christiania, Norway.
Cockerill, John, and Co. (m): *Offices and Works*, Hoboken, Belgium.
Collingwood Shipbuilding Co., Ltd. (s): *Head Offices*, Collingwood, Ont., Canada; *Dry Docks at* Collingwood, Ont.; and Kingston, Ont.
Companhia Nacional de Navegaçao Costeira (s) (d): *Registered Offices*, 303-331, Avenida Rodriques Alves, Rio do Janeiro, Brazil.
Compañia Euskalduna de Construcion y Reparacion de Buques (s) (m) (d): *Offices*, Bilbao, Spain.
Copenhagen Floating Dock and Shipbuilding Co. (Kjöbenhavns Flydedok og Skibsvarft A/S) (s) (m) (d): *Registered Offices*, Copenhagen, Denmark.
Coughlan and Sons, Ltd., John (s): *Offices and Works*, Vancouver, B.C., Canada.
Cramp and Sons Ship and Engine Building Co., William (s) (m) (d): *Head Offices and Works*, Richmond and Norris Streets, Philadelphia, Pa., U.S.A.; *Branch Offices*, 100, Broadway, New York City, N.Y., U.S.A.; *Offices of Shipyard*, Beach and Palmer Streets, Philadelphia, Pa., U.S.A.
Danziger Schichauwerft (s): *Offices and Works*, Danzig.
Davie Shipbuilding and Repairing Co., Ltd. (s) (m) (d): *Registered Offices*, Lauzon, Levis, Quebec, Canada; *Branch Offices*, Montreal, Canada.
De Lavals Angturbin, Aktiebolag (m): *Offices*, Saltsjö-Järla, Stockholm, Sweden.
"De Schelde," Koninklijke, Maats. (s): *Offices*, Flushing, Holland.
Deutsch-Luxemburgische Werft (s): *Offices and Works*, Emden, Germany.
Deutsche Werft, Aktien-Gesellschaft (s) (m) (d): *Main Offices*, Parkhotel, Teufelsbrücke, near Hamburg, Germany; *Registered Offices*, Hamburg I, Germany.
Deutsche Werke Aktiengesellschaft (s) (m) (d): *Head Offices*, West-fälischestrasse 90, Wilmersdorf, Berlin W9, Germany.
Dominion Shipbuilding Co. (s): *Offices and Works*, Toronto, Ont., Canada.
"Dordrecht," Naamlooze Vennootschappij Scheepswerf ("Dordrecht" Shipbuilding Co., Ltd.): *Offices and Works*, Dordrecht, Holland.
Doullut and Williams Shipbuilding Co., Inc. (s): *Offices and Works*, New Orleans, La., U.S.A.
Downey Shipbuilding Corporation (s): *Offices and Works*, Long Island, N.Y., U.S.A.
Dyle et Bacalan (s): *Offices and Works*, Bordeaux, France.
Echevarrieta y Larrinaga (s): *Offices and Works*, Cadiz, Spain.
Eisenbeton Schiffbau (s): *Offices and Works*, Bremen, Germany.
Elbeschiffswerft (s): *Offices and Works*, Wilhelmsburg, Germany.
Elbe Nordseewerke (s): *Offices and Works*, Hamburg, Germany.
Elsinore Shipbuilding and Engineering Co. (Aktieselskabet Helsingors Jernskibs og Maskinbyggeri) (s) (m) (d): *Offices and Works*, Elsinore, Denmark.
Eriksbergs Mek. Verkstads A/B (s): *Offices and Works*, Gothenburg, Sweden.
Etablissements Caillard et Cie (m): *Offices and Works*, Rue de Prony, 20, Havre, France.
Federal Shipbuilding Co. (s) (m) (d): *Registered Offices*, Kearney, N.J., U.S.A.; *Sales Offices*, 26, Beaver Street, New York, U.S.A.; *U.K. Agents*, Chas. G. Dunn & Co., 6, Water Street, Liverpool.

Fijenoord Co. (Maatschappij voor Scheeps en Werktuigbouw Fijenoord) (s) (m): *Head Offices*, Rotterdam, Holland.

Flender Shipyard (s): *Offices and Works*, Siems, Lubeck, Germany.

Flensburger Schiffsbau-Gesellschaft (s) (m) (d): *Offices and Works*, Werftstrasse 24, Flensburg, Germany.

Fredriksstad Mek. Verksted Aktieselskabet (s): *Offices and Works*, Fredriksstad mek. Verksted, Fredriksstad, Norway.

Frerischswerft (m): *Offices and Works*, Einswarden, Germany.

Frichs, A/S. (s) (m): *Offices and Works*, Aarhus, Denmark; *Branch Office*, 21, Frederiksgade, Copenhagen.

Fuginagata Shipyard (s): *Offices and Works*, Osaka, Japan.

Fuller and Co., George A. (s): *Offices and Works*, Wilmington, U.S.A.

Gall und Seitz (s): *Offices*, Hamburg, Germany

Ganz and Co., Danubius (s) (m) (d): *Head Offices*, Budapest, Hungary: *Works*, Ratibor, Upper Silesia; Leobersdorf, near Vienna, Austria; *Wharves at* Kraljevica, Serbia.

Gebrüder Sachsenberg (s): *Offices*, Rosslau, Germany.

General Electric Co. (m): *Offices and Works*, Schenectady, N.Y., U.S.A.

Giessen and Zonen, G. Van Der (s): *Offices*, Krimpen, Holland.

Götaverken, Aktiebolaget (s) (m) (d): *Offices and Works*, Gothenburg, Sweden.

Great Lakes Engineering Works (s) (m) (d): *Head Offices*, River Rouge, Mich.; *Shipyards*, River Rouge, Mich., and Ashtabula, Ohio; *Engine Works*, Detroit, Mich., U S.A.

Groningen Scheepsverft and Machinefabriek (s) (m): *Offices and Works*, Groningen, Holland.

Gutehoffnungshütte (m): *Offices*, Oberhausen, Germany.

Halifax Shipyards, Ltd. (d): *Offices and Works*, Halifax, Canada.

Harma Jernstoperi and Mek. Verkstad (m): *Offices*, Harma, Norway.

Holeby Diesel Engine Works, Ltd (m): *Registered Offices and Works*, Holeby, Denmark; *Branch Offices*, 9, Vœrnedamsvej, Copenhagen, Denmark.

Hong Kong and Whampoa Dock Co., Ltd. (s) )m) (d): *Head Offices*, Queen's Buildings, New Praya, Hong Kong.

Hooven, Owens, and Rentschler Co. (m): *Head Offices*, Hamilton, Ohio, U.S A.

Howaldtswerke (s) (m) (d): *Offices and Works*, Kiel, Germany.

Inglis, J., and Co. (m): *Offices*, Toronto, Ont., Canada.

Ishikawajima Shipbuilding and Engineering Co. (s) (m): *Offices*, Tokyo, Japan.

Kawasaki Dockyard Co., Ltd. (s) (m) (d): *Registered and Head Office*, Kobe, Japan: *Engineering, Drydocking, Repairing, and Shipbuilding Works at* Kobe, Japan; *Branch Offices and Works*, Hyogo, Kobe; Fukiai, Kobe; and Dairen, North China.

Kiangnan Dock and Engineering Works (s) (m) (d): *Offices and Works*, Shanghai, China.

King and Co., Ltd., John (s) (m): *Offices and Works*, Howrah, India.

Kobe Steel Works (s) (m) (d): *Head Offices*, Kobe, Japan; *Branch Offices*, The Moji Brass Foundry, Komorie, Moji, Japan; Tokyo Kaijo Building, Yurakucho, Kojimachi-Ku, Tokyo, Japan; and No. 4, Shioiro Yokosuka, No. 6, Sakaigawa, Kure, Japan.

Kockums Mekaniska Verkstads Aktiebolaget (s) (m) (d): *Offices*, Malmö, Sweden.

Koninklijke Maatschappij De Schelde. *See* De Schelde.

Kremer, John D. W. (s): *Offices*, Elmshorn, Germany.

Krupp Aktien-Gesellschaft Germaniawerft, Fried. (m): *Head Offices and Works*, Kiel-Gaarden, Germany.

Larvik Slip and Verksted (s) (m) (d): *Offices and Works*, Larvik, Norway.

Limhamns Sheppsvarv Aktiebolag. (s): *Offices and Works*, Limhamn, Sweden.

Lindholmen-Motala Aktiebolaget (s) (m) (d): *Head Offices and Works*, Gothenburg Sweden.

Llewellyn Iron Works (s): *Offices*, Los Angeles, Cal., U.S.A.

Lobithsche Scheepsbouw Maatschappij, Voorheen Gebroeders Bodewes, N.V. (Lobith Shipbuilding Co.) (s) (m): *Registered Offices*, Lobith, Holland; *Agent in England*, R. Paterson, "Eastwood," Cottingham, E. Yorks.

Los Angeles Shipbuilding and Dry Dock Co. (s) (m) (d): *Registered Offices*, San Pedro, Cal., U.S.A.; *Branch Offices*, 401, Baltour Building, 351, California Street, San Francisco, Cal., U S.A.

Lübecker Machinenbau Gesellschaft (s) (m) (d): *Offices and Works*, Lübeck, Germany.

Marinens Hovedverft (s): *Offices*, Hortens, Norway.

Maskin-och Brobyggnads Aktiebolaget (s) (m) (d): *Head Offices and Works*, Helsingfors, Finland.

Melbourne Steamship Co., Ltd. (d); *Head Offices*, 31, King Street, Melbourne, Australia.
Merchant Shipbuilding Corporation (s): *Works*, Bristol, Pa., U.S.A. (2 yards).
Meyer's Shipbuilding Co., J. (s): *Offices and Works*, Zalt Bommel, Holland
Midland Shipbuilding Co., Ltd. (s): *Registered Offices and Works*, Midland, Ontario, Canada.
Mitsubishi Zosen Kabushiki Kaisha, Ltd. (s) (m) (d): *Head Office*, Marunouchi, Tokyo; *Works*, Nagasaki and Kobe, Japan.
Mitsui Bussan Kaisha, Ltd. (s) (d): *Offices*, 3, Kaigandori, Kobe, Japan.
Mitsui and Co. (s): *Works*, Tama, Inland Sea, Japan.
Moller, A. P. (m): *Works*, Odense Shipyard, Denmark.
Monica, A. (m) : *Works*, Figueira da Foz, Portugal.
Moore Dry Dock Co. (s) (m) (d): *Head Offices*, 803, Balfour Building, San Francisco, U.S.A.; *Works*, Oakland, Cal., U S.A.
Moss Værft, Aktieselsk (s) (m) (d); *Registered Offices*, Moss, Norway.
Nakskov Skibsværft Akt. (s) (d): *Offices*, Nakskov, Denmark.
"Neptun," Actien-Gesellschaft, Schiffsbau und Maschinenfabrik (s) (m) (d) : *Head Offices*, Rostock, Germany
Netherlands Shipbuilding Co. (Nederlandsche Scheepsbouw Maatschappij) (s): *Head Offices and Shipyard*, Conradstraat, Amsterdam, Holland; *London Offices*, 82-83, Fenchurch Street, E.C.3.
New Burrell-Johnson Works (s): *Offices and Works*, Yarmouth, N.S., Canada.
New Engineering and Shipbuilding Works, Ltd. (s) (m) (d): *Head Offices*, 45, Yangtszepoo Road, Shanghai, China.
Newport News Shipbuilding and Dry Docks Co. (s) (m) (d): *Head Offices*, 233 Broadway, New York, U.S.A.; *Works*, Newport News, Va., U.S.A.
New York Shipbuilding Corporation (s) (m): *Head Offices and Works*, Camden, New Jersey, U.S.A.; *Branch Offices*. 1, Broadway, New York, U.S.A.
New Waterway Shipbuilding Co. (Scheepsbouw Maatschappij "Nieuwe Waterweg") (s) (m) (d): *Offices and Works*, Schiedam, Holland.
Nicolo Odero and Co., Foce (s) : *Offices and Works*, Genoa, Italy.
Nitta Shipyard (s) : *Offices and Works*, Osaka, Japan.
Nobellessner Co. (s) : *Offices and Works*, Reval, Esthonia.
Nobiskong Werft (s): *Offices and Works*, Rendsberg, Germany.
Norddeutsche Union Werke (s): *Offices and Works*, Tonning, Germany.
Norddeutsche Werft (s): *Offices and Works*, Bremerhaven, Germany.
North-West Bridge and Iron Co. (s) : *Offices and Works*, Portland, Or., U.S.A.
Nusche & Co., A.G. (s) (d): *Offices and Works*, Grabow, Stettin, Germany.
Nylands Verksted (s) (m) (d) : *Offices and Works*, Christiania, Norway.
Odero, Fu Aless. and Co., N. (s): *Offices and Works*, Sestri Ponente, Italy.
Oderwerke (s): *Offices and Works*, Stettin, Germany.
Ono Shipyard (s): *Offices and Works*, Osaka, Japan.
Oresunds-varvet, Aktiebolaget (s) (m): *Registered Offices and Works*, Landskrona, Sweden.
Orlando, Fratelli (s) : *Offices and Works*, Leghorn, Italy.
Orlogsvarftet (s): *Offices and Works*, Copenhagen, Denmark.
Osaka Ironworks, Ltd. (s) (m) (d) : *Head Offices*, Sakurajima-Ajikawa, Osaka; *Works at* Sakurajima, Osaka; Innoshima; and Bingo, Japan.
Oskarshamns Mekaniska Verkstads Och Skeppsdockas Aktiebolag. (s) (m) (d): *Offices and Works*, Oskarshamn, Sweden.
Ostzee werft Schiffbau und Maschinenfabrik A. G. (s) (d): *Works*, Frauendorf, Stettin, Germany.
Ottensener Werke (m): *Offices and Works*, Frauendorf, Stettin, Germany.
Pacific Coast Shipbuilding Co. (s) : *Offices and Works*, Bay Point, Cal., U.S.A.
Pattison, C. and T. T. (Officine e Cantieri Napoletani) (s) (m): *Offices*, Naples, Italy.
Poole and Steel (s) (m): *Head Offices*, Stephen Street, Balmain, Sydney, N.S.W.; *Branch Offices*, Osborne, Port Adelaide, Australia.
Port Union Shipbuilding Co. (s) : *Offices and Works*, Newfoundland.
Pusnæs Stoberi and Mek. Verksted (m): *Offices and Works*, Arendal, Norway.
Randolph Skibsbijggeri Fevig (s): *Offices and Works*, Norway.
Reiherstieg Schiffswerfte und Maschinenfabrik (s): *Offices and Works*, Hamburg, Germany.
Rosenberg Mek. Versted, A/S (s) (d) : *Offices and Works*, Stavanger, Norway.
Rotterdamsche Droogdok Maatschappij (Rotterdam Dry Dock Co.) (s) (m) (d): *Head Offices and Works*: Rotterdam, Holland; *London Agents*, Peel, Boundy and Co., Billiter House, Billiter Street, E.C.3.
Sandvikens Skeppsdocka (d): *Offices and Works*, Helsingfors, Finland.
San Rocco, Cantiere. *See* Cantiere San Rocco.
Schichau, F. (s) (m) (d) : *Offices and Works*, Elbing, Danzig.

Schneider et Cie. (s): *Head Offices*, 42, Rue d'Anjou, Paris; *Principal Works*, Le Creusot, Le Breuil, "Henri Paul" le Havre, Harfleur, le Hoc, Champagne-sur-Seine, et la Londe-les-Maures; *Shipyards*, Chalon-sur-Saône, France.

Seebeck and Co., Georg (Aktien-Gesellschaft, Schiffswerft, Maschinenfabrik und Trockendocks) (s) (m) (d): *Head Offices*, Bremerhaven-Geestemünde, Germany; *Works*, Geestemünde (Shipbuilding); Bremerhaven (Ship-repairing).

Selvik Skibsværft (s): *Offices and Works*, Selvik, Norway.

Shalimar Works, Ltd (s) (m) (d): *Head Offices*, 63, Foreshire Road, Sibpur Howrah, Bengal, India; *Registered Offices*, 6, Lyons Range, Calcutta, India; *Works at* Jharia and Chittagong, Howrah, India.

Shanghai Dock and Engineering Co., Ltd. (s) (m) (d): *Head Offices*, 26, Broadway, Shanghai, China; *London Agents*, H. J. Stockton and Co., Ltd., 16, Philpot Lane, E.C.3.

Skiens Verkstedr. (s): *Offices and Works*, Skiens, Norway.

Solvesborgs varvs. & Rederiak (s) (m) (d): *Offices and Works*, Sölvesborg, Sweden.

Smulders, A. F. *See* Werf Gusto.

Società Anonima Bacini e Scali Napoletani (d): *Offices and Shipyard*, Via Marinella, Naples, Italy.

Società Anonima Fiat Stabilimento Grandi Motori (m): *Head Offices*, Via Cuneo 20, Turin, Italy.

Société Anonyme des Anciens Chantiers Dubigeon (s): *Head Offices and Works*, Nantes-Chantenay, France.

Société Anonyme des Anciens Établissements Groignard (d): *Offices*, Boulevard des Bassins, Cap-Pinede, Marseilles, France.

Société Anonyme des Ateliers Duchesne et des Ateliers Bossière (m) (d): *Registered Offices*, 30 Rue J. J. Rousseau, Havre, France.

Société Anonyme des Ateliers et Chantiers Maritimes du Boulonnais (s) (m): *Offices*, Boulevard de Chatillon, Boulogne, France.

Société Anonyme des Chantier et Ateliers de Saint Nazaire, Penhöet (s) (m): *Head Offices*, 6 bis, Rue Auber, Paris 9$^{e}$, France; *Works*, Chantier de Penhöet, Saint Nazaire-sur-Loire; and Chantier de Normandie, Grand-Quévilly, près Rouen, France.

Société Anonyme des Chantiers et Ateliers de la Gironde (s) (d): *Head Offices*, 3 Rue Montalivet, Paris.

Société Anonyme des Chantiers et Ateliers de Provence (s) (m): *Head Offices*, 40 Chemin de la Madraque, Marseilles, France.

Société Anonyme des Forges et Chantiers de la Méditerranée (s) (m): *Head Offices*, 25, Boulevard Malesherbes, Paris, France.

Société Anonyme de Travaux Dyle et Bacalan (s) (m) (d): *Registered Offices*. Chantiers de Bordeaux, 5, Rue Achard, Bordeaux, France.

Société des Ateliers et Chantiers de France (s) (m) (d): *Works and Shipbuilding Yard*, Dunkerque; *Registered Offices*, Rue La Boëtie, 5, Paris, France.

Société des Ateliers Lorientais (s): *Head Offices*, Rue de la Victoire 56, Paris, France.

Société Franco-Chinoise de Constructions Métalliques et Mécaniques (s) (m) (d): *Head Offices*, 9, Quai de France, Shanghai, China; *Paris Offices*, 9, Rue de Seze.

Société Marseillaise de Constructions Mécaniques (s) (d): *Offices and Works*, Marseilles, France; *London Agents*, J. N. Gilby, 26, Great St. Helen's, E.C. 3.

Société Provençale de Constructions Navales (s) (m) (d): *Registered Offices*, 3, Rue Montalivet, Paris, France.

South-Western Shipbuilding Co. (s): *Offices and Works*, San Pedro, Cal., U.S.A.

Stabilimento Tecnico Triestino (s) (m) (d): *Head Offices*, Trieste, Italy; *Works*, Cantiere San Marco, Italy (Shipbuilding); Fabbrica Macchine Sant' Andrea, Italy (Engineering).

Standard Shipbuilding Corporation (s): *Offices and Works*, New York, U.S.A.

Standifer Corporation, G. M. (s): *Works*, Vancouver, Wash., U.S.A.

Staten Island Shipbuilding Co. (s): *Offices and Works*, Staten Island, N.Y., U.S.A.

Stavanger Stoberi & Dok (s) (m) (d): *Offices and Works*, Stavanger, Norway.

Stuhr's Works, P. Ph. (s): *Offices and Works*, Aalborg, Denmark.

Stulcken Sohn, H. C. (s): *Offices and Works*, Hamburg, Germany.

Submarine Boat Corporation (s): *Offices and Works*, Newark, New Jersey, U.S A.

Sulzer Frères (m): *Head Offices and Works*, Winterthur, Switzerland; *London Offices*, 31, Bedford Square, W.C. 1; *Manchester Offices*, 21, Spring Gardens; *Swansea Offices*, Castle Buildings.

Sun Shipbuilding Co. (s): *Works*, Chester, Pa., U.S.A.

Svendborg Skibsværft (s): *Offices and Works*, Copenhagen, Denmark.

Svenska Turbinfabriks Aktiebolaget Ljungström (m): *Registered Offices*, Finspong, Sweden.

Taikoo Dockyard and Engineering Co. of Hong Kong, Ltd. (S) (M) (D): *Head Offices*, Hong Kong.
Tampa Shipbuilding and Engineering Co. (S) (M) (D): *Offices*, Foot of Grant Street Estuary, Foot of Water Street, Tampa, Fla., U.S.A.
Tecklenborg, Joh. C. (S) (M) (D): *Offices and Works*, Geestemünde, Germany.
Texas Steamship Co. (S): *Offices and Works*, Bath, Maine, U.S.A.
Thompson and Co. (Castlemaine) Proprietory, Ltd. (S) (M) (D): *Head Offices*, Castlemaine, Victoria, Australia; *Shipbuilding and Ship-repairing Works*, Williamstown, Victoria; *Engineering Works*, Castlemaine, Victoria.
Tidewater Shipbuilding Co. (S): *Offices and Works*, Three Rivers, Quebec, Canada.
Todd Shipyards Corporation (S) (M) (D): *Registered Offices*, 25, Broadway, New York, N.Y., U.S.A.; Brooklyn and Tacoma, U.S.A.
Trondhjems MekaniskeVærksted (S) (M) (D): *Head Offices*, Inderredveien, 18, Trondhjem, Norway; *Branch Works*, Trolla Bruk, Trondhjem, Norway.
Uchida Shipbuilding Co. (S): *Offices and Works*, Yokohama, Japan.
Union Construction Co. (S) (M): *Offices*, Foot of 14th Street, Oakland, Cal., U.S.A
Union Shipbuilding Co. (S): *Offices and Works*, Baltimore, U.S.A.
United Engineers, Ltd. (S) (M) (D): *Head Offices*, Damar Road, Singapore, Straits Settlements.
United Machine Factories (M): *Works*, Prague, Bohemia.
Unterweser Schiffbau (S): *Offices and Works*, Lebe, Germany.
Uraga Dock Co. (L): *Offices and Works*, Kobe, Japan.
Vaxholmsvarvet (S): *Offices and Works*, Ramso, Norway.
Vuijk und Zonen, A. (S): *Head Offices*, Kralingscheveer, near Rotterdam; *Works* Kralingscheveer, near Rotterdam, and Capelle, a/d Ysel, Holland.
Vulcan Ironworks Co. (S): *Offices and Works*, Jersey City, N.J., U.S.A.
Vulcan Werft (Hamburg und Stettin Actiengesellschaft) (S) (M) (D): *Head Offices*, Hamburg 9; *Works*, Stettin and Hamburg, Germany.
Walkers, Ltd. (S): *Head Offices and Works*, Maryborough, Queensland, Australia.
Wallace Shipyards, Ltd. (S) (M) (D): *Shipyard and Main Offices*, North Vancouver, B.C.; *City Office*, Credit Foncier Building, Vancouver, B.C.; *Foundry*, Industrial Island, Vancouver, B.C., Canada.
Werf Conrad (S) (M): *Offices and Works*, Haarlem, Holland; *London Office*, Friar's House, 39/41, New Broad Street, E.C.3.
Werf de Noord (S): *Offices and Works*, Alblasserdam, Holland.
Werf Gusto (A. F. Smulders) (S): *Offices and Works*, Schiedam, Holland.
Werf Zeeland, N. V. (S): *Offices and Works*, Hansweert, Holland.
Werkspoor Engine Works (S): *Head Offices*, Amsterdam; *Works*, Amsterdam and Zuilen, near Utrecht, Holland.
"Weser" Aktien-Gesellschaft (S) (M) (D): *Registered Offices*, 18, Werftstrasse, Bremen 13, Germany.
Westinghouse Electric and Manufacturing Co. (M): *Registered Offices*, East Pittsburgh, Penn, U.S.A.
Winton Engine Works (M): *Offices and Works*, Cleveland, Ohio, U.S.A.
Yokohama Dock Co. (D): *Offices and Works*, Yokohama, Japan.
Zeeland, Werf, Holland. *See* Werf Zeeland.

# THE STEAMSHIP SERVICES OF THE WORLD.

All lines run return journeys in reverse order to services given, except where otherwise stated.

(Particulars of the Steamship Lines and Companies mentioned will be found in the List of "British and Foreign Shipowners," p. 582.)

## AFRICA, EAST.

British India Line; from London and Middlesbrough to Principal Ports of East Africa (*passengers and cargo*).

Clan Line; from Glasgow, Liverpool and Newport to Madagascar (*passengers and cargo*).

Compagnie Havraise Péninsulaire de Navigation à Vapeur; from Havre and Marseilles to Madagascar (East Coast), Réunion and Maurice Isle (*passengers and cargo*); from Havre, Bordeaux, and Marseilles to Madagascar (West Coast) and Mozambique (*passengers and cargo*).

Deutsche Ost-Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief East African Ports (*passengers and cargo*).

Hall Line; from Glasgow and Liverpool to all East African Ports (*passengers and cargo*).

Hamburg-Amerika Linie; from Hamburg to Madeira, Canary Islands, and Chief Ports of East Africa (*passengers and cargo*).

Hamburg-Bremen-Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief East African Ports (*passengers and cargo*).

Harrison Line; from Birkenhead and Glasgow to Principal Ports of East Africa (*cargo*).

Houlder Bros. and Co., Ltd.; from England to Chief East African Ports (*passengers and cargo*).

Houston Line; from Middlesbrough, London, Glasgow, and Liverpool to Chief East African Ports (*passengers and cargo*).

Union-Castle Line; from London and Southampton to all East African Ports (*passengers, mail, and cargo*).

Woermann-Linie, Aktien-Gesellschaft; from Hamburg to Madeira, Canary Islands, and Chief East African Ports (*passengers and cargo*).

## AFRICA, SOUTH.

Aberdeen Line; from London and Plymouth to Durban, Cape Town, and Port Elizabeth (*passengers and cargo*).

British Africa Shipping and Coaling Co., Ltd.; from London and Plymouth to Durban and Cape Town (*passengers and cargo*).

Clan Line; from Glasgow, Liverpool, and Newport to Cape Town, Port Elizabeth and Durban (*passengers and cargo*).

Deutsche Ost-Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief South African Ports (*passengers and cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from United Kingdom (*weekly cargo services*); from Australia (*fortnightly cargo sailings*); from New York to Cape Town, Port Elizabeth, and Durban (*fortnightly cargo sailings*).

Furness, Withy and Co., Ltd. *See* Prince Line.

Hall Line; from Glasgow and Liverpool to Cape Town, Mossel Bay, Algoa Bay, East London, Natal, Delagoa Bay, and Mauritius (*cargo*).

Hamburg-Amerika Linie; from Hamburg to South Africa (*cargo and passengers*).

Hamburg-Bremen Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief South African Ports (*passengers and cargo*).

Harrison Line; from Birkenhead, Glasgow and Newport (*cargo*).

Houlder Bros. and Co., Ltd.; from London and Plymouth to Cape Town, Durban, and Port Elizabeth (*passengers and cargo*).

Houston Lines; from United Kingdom and from United States (*both cargo services, carrying a few passengers*).

Natal Line of Steamers, Ltd.; from London and Plymouth to chief South African Ports (*passengers and cargo*).

Peninsular and Oriental Service to Australia; from London to Adelaide, Melbourne, and Sydney *viâ* Cape Town (*passengers, one class only, mails and cargo*).

Prince Line; from New York to South African Ports (*cargo*).

Shaw, Savill and Albion Co., Ltd.; from London to Australia, *viâ* the Cape of Good Hope (outwards, *general cargo;* homewards, *a large amount of meat and dairy produce in cold storage*).

Union-Castle Line; from London and Southampton to Beira, Chinde, Cape Town, Port Natal, and East London (*passengers, mails, and cargo*).

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, and Finland, to chief South African Ports (*cargo*).

White Star Line; from Liverpool to Australia, calling at Cape Town (*passengers and cargo*).

Woermann-Linie, Aktien Gesellschaft; from Hamburg to Madeira, Canary Islands, and Chief South African Ports (*passengers and cargo*).

## AFRICA, WEST.

African Steamship Co.; from Liverpool and London to principal West African Ports (*passengers and cargo*).

British and African Steam Navigation Co., Ltd.; from Liverpool and Rotterdam to principal West African Ports (*passengers and cargo*).

Deutsche Ost-Afrika Linie; from Hamburg to Madeira, Canary Islands, and Chief West African Ports (*passengers and cargo*).

Elder, Dempster and Co. Ltd.; from Liverpool, London, and Rotterdam to principal West African Ports (*passengers and cargo*).

Hamburg-Amerika Linie; from Hamburg to West Africa (*passengers and cargo*); Hamburg to South West Africa (*passengers and cargo*).

Holt and Co. (Liverpool), Ltd.; from Liverpool to principal West African Ports (*passengers and cargo*).

Houston Lines; from London, Glasgow, and Liverpool (*passengers and cargo*).

Union-Castle Line; from London and Southampton to Port Amelia, Mozambique, Réunion, Mombassa, and Zanzibar (*passengers, mails, and freight*).

Woermann-Linie, Aktien-Gesellschaft; from Hamburg to Madeira, Canary Islands, and Chief West African Ports (*passengers and cargo*).

## AMERICA, CENTRAL.

Blue Funnel Line. *See* Alfred Holt and Co.

Canadian Pacific Railway Co.; from Montreal and Quebec (summer), St. John (winter), to Havana, Cuba, *viâ* Boston (*passengers and cargo*).

Canadian Government Merchant Marine, Ltd.; Montreal to Havana, Cuba (*cargo*); Montreal to Nassau, Kingston (Ja.), Jamaica and Belsize (B.H.) (*passengers and cargo*); Montreal to Barbados, Trinidad, and British Guiana (*cargo*). During the winter these services operate from Halifax, N.S.

Clyde Steamship Co.; from New York to Santo Domingo City and Azua, *viâ* Turks Island, calling at Monte Cristo, Puerto Plata, Samana, Sanchez, La Romana, and Macoris (*passengers and cargo*).

Cuban Line; from Antwerp and London to the Ports of Central America (*passengers and cargo*).

Davies Steamship Co., W. R.; from London to Panama (*passengers and cargo*).

Elders and Fyffes; from Avonmouth and Easton to Panama (*cargo*).

Furness Line; from New York to Bermuda (*passengers and cargo*); New York to West Indies (*passengers and cargo*); from New York to Trinidad (*passengers and cargo*).

Furness, Withy and Co., Ltd. *See* Furness Line.

Hamburg-Amerika Line; from Hamburg to Cuba and Mexico (*passengers and cargo*); from Hamburg to West Indies (*passengers and cargo*); from Hamburg to West Coast Ports, *viâ* Panama (*passengers and cargo*).

Harrison Line; from Glasgow to West Indies and Demerara (*cargo*); from London to West Indies and Demerara (*cargo*); from Swansea, Glasgow, and Liverpool to North Pacific Ports, *viâ* Panama Canal (*cargo*); from Liverpool to West Indies, Mexico, and Brazil (*cargo*).

Holt and Co., Alfred; from Liverpool (part loading at Glasgow, Bristol Channel Ports, Hamburg, and Bremen) to the Straits Settlements, Philippines, China, Japan, Korea, East Siberia, Kingston (Jamaica), Pacific Coast, United States, and Canada, passing through the Panama Canal (*passengers and cargo*).

Houston Lines; from River Plate Ports to United States and Canada, calling at Cuba (*cargo service, carrying a few passengers*).

Hugo Stinnes Linien; from Hamburg to Cuba and Mexico (*passengers and cargo*).

Larrinaga Line; from Liverpool to Antilla, Cardenas, Cienfuegos, Cuba, Havana, Mantanzas, Sagua la Grande, and Santiago de Cuba (*passengers, freight, and mails*).

Leyland Line; from Liverpool, London, and Manchester to Panama (*passengers and cargo*).

New York and Porto Rico Steamship Co. *See* Porto Rico Line.

New Zealand Shipping Co., Ltd.; from London through the Panama Canal to New Zealand and Australia.

Panama Rail Road Steamship Co.; from New York, Port au Prince (Hayti), to Cristobal (Canal Zone, Panama) (*passengers and cargo*).

Porto Rico Line; from New York to San Juan, Ponce, and Mayaguez (*freight and passengers*); from New Orleans to San Juan, Ponce, and Mayaguez (*freight*).

Royal Mail Steam Packet Co.; from London and Hull to West Indies and British Guiana (*cargo only*); from Hull and London to Jamaica (*cargo only*); from Hull and London to Hayti and Domingo (*cargo only*); from Hull and London to Colon and Central American Pacific Ports (*cargo only*); from Hull, Bremen, and Rotterdam to Havana and Galveston (*passengers, mails, and cargo*); from St. John, N.B., and Halifax, N.S., to Bermuda, West Indies, and Demerara (*passengers, mails and cargo*).

Shaw, Savill and Albion Co., Ltd.; from London through the Panama Canal to New Zealand; this service is run in conjunction with the White Star Line (*passengers and cargo*).

Stinnes Linien. *See* Hugo Stinnes Linien.

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, and Finland to Cuba, Vera Cruz, and Tampico (*cargo and a few passengers*).

White Star Line, jointly with Shaw, Savill and Albion Co., Ltd.; from London to New Zealand *viâ* Panama Canal (*passengers and cargo*).

## AMERICA, SOUTH.

"Artus" Line. *See* Hugo Stinnes Linien.

Booker Line; from Liverpool to principal South American Ports (*cargo*).

Booth Line; from Havre, Liverpool, Lisbon, London and Madeira, to principal South American Ports (*passengers and cargo*).

British and Argentine Steam Navigation Co., Ltd.; from Liverpool to River Plate Ports (*passengers and cargo*).

Canadian Government Merchant Marine, Ltd.; Montreal to Santos, Rio de Janeiro, Monte Video, and Buenos Aires (*cargo*). During the winter months this service operates from Halifax, N.S.

Compania Naviera Sota y Aznar (Spanish Line); from Hamburg to Rio de Janeiro, Santos, Monte Video and Buenos Aires.

Cornborough Shipping Line, Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Davies Steamship Co., W. R.; from Liverpool to principal South American Ports (*cargo*).

Donaldson South American Line; from Glasgow, Liverpool, and London to Monte Video and Buenos Aires—also by transhipment to other River Plate Ports (*refrigerated cargo*).

Grace Lines; from New Orleans to Ports of Equador, Peru, and Chile (*passengers, cargo, and mails*).

Furness-Houlder Argentine Lines, Ltd.; from London and Liverpool to chief Ports of Argentine and Uruguay (*refrigerated cargo and a few first-class passengers*).

Furness, Withy and Co., Ltd. *See* Prince Line and Furness-Houlder Argentine Lines.

Hall Line; from Calcutta to River Plate Ports (*cargo*).

Hamburg-Amerika Line; from Hamburg to Brazil and La Plata Ports (*passengers and cargo*).

Hamburg-Südamerikanische Dampfschifffahrts-Gesellschaft; from Hamburg to Brazil, Uruguay, and Argentina (*passengers*).

Henderson and Co., Ltd.; from Glasgow to principal South American Ports (*cargo*).

Holland and Co., Ltd., Arthur; from Newport to principal South American Ports (*cargo*).

Houlder Bros. and Co., Ltd.; from Antwerp, London, Liverpool, and Bristol to Monte Video, Buenos Aires, and Rosario, calling *en route* at Las Palmas or Teneriffe (Outwards, *general cargo and passengers*; Homewards, *frozen and chilled meat, dairy produce, general cargo, and passengers*).

Houston Lines; from Glasgow and Liverpool to River Plate; from United States to River Plate; from Canada to River Plate; from West Indies to River Plate (*all cargo services, carrying a few passengers*).

Hugo Stinnes Linien; from Hamburg to Portuguese Ports, Pernambuco, Monte Video, Buenos Aires, and Rosario (in association with the "Artus" Line, Danzig) (*passengers and cargo*).

Kaye, Son and Co., Ltd.; from Liverpool to principal South American Ports (*cargo*).

Koninklijke Hollandsche Lloyd; from Amsterdam to Buenos Aires, calling *en route* at Southampton, Cherbourg, La Corunna, Vigo, Leixoes, Lisbon, Las Palmas, Pernambuco, Bahia, Rio de Janeiro, Santos, and Monte Video (*passengers, mails, and freights*).

Lamport and Holt; from Liverpool, Glasgow, and Manchester to Brazil, *viâ* Portugal; from Liverpool and Glasgow to the River Plate, *viâ* Spain; from Middlesbrough, Hamburg, Antwerp, London, and Cardiff to Brazil and the River Plate; from New York to North Brazil; from New York to Central and South Brazil; from New York to River Plate Ports; from New Orleans to Brazil and River Plate; from Glasgow, Liverpool, and Havre to the West Coast Ports of South America (*cargo*); from New York to Brazil and the River Plate, calling at the West Indies (*passengers*).

Leeds Shipping Co., Ltd.. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

MacIver Line; from London to principal South American Ports (*cargo*).

Nelson, Ltd., H. and W.; from London to Buenos Aires, calling on the outward journey at Boulogne, Corunna, Vigo, Rio de Janeiro, and Monte Video, and on the homeward journey at Monte Video and Las Palmas; from Liverpool to Buenos Aires, calling at Monte Video, and at Las Palmas on the homeward voyage (*cargo, passengers, and mails*).

Oakwin Steam Ship Co., Ltd. *See* Smith and Sons Ltd., Sir Wm. Reardon.

Prince Line, Ltd.; from London, Middlesbrough, and Antwerp to River Plate Ports (*cargo*); from New York to River Plate Ports (*cargo*); from New York to Brazil (*cargo*).

Ritson, F. and W.; from Glasgow, Liverpool, and London to principal South American Ports (*cargo*).

Roland-Linie, Aktien Gesellschaft; from Bremen and Hamburg to Chile, Peru, and Ecuador (*passengers and cargo*).

Rotterdam-Zuid Amerika Lijn; from Hamburg, Rotterdam, and Antwerp to Buenos Aires, Monte Video, Santos, Rio de Janeiro, Bahia, and Pernambuco, calling at Bilbao, Santander, and Vigo (*cargo, carrying a few passengers*).

Royal Mail Steam Packet Co.; from Southampton to Buenos Aires, calling at French, Spanish, and Portuguese Ports, Madeira, Las Palmas, Teneriffe, St. Vincent (C.V.) and the Ports of Brazil, Uruguay, and Argentina (*mails, passengers, and cargo*), and similar service from Liverpool; from London to Rio de Janeiro, calling at Hamburg, Antwerp, Hull, and Swansea (*cargo only*), and similar service to Santos; from Hull and London to Buenos Aires (*cargo only*); from Hull and London to Demerara in British Guiana (*cargo only*); from Hull and London to Cristobal and Columbia (*cargo only*); from Barry and Swansea to Rio de Janeiro and Santos (*cargo only*); from St. John, N.B., and Halifax, N.S., to Bermuda, West Indies, and Demerara, British Guiana (*passengers, mails, and cargo*).

St. Just Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Shaw, Savill and Albion Co., Ltd.; from London to New Zealand, proceeding on the outward journey *viâ* the Panama Canal, and on the homeward journey *viâ* Cape Horn, calling at Monte Video and Teneriffe (*cargo, and meat and dairy produce in cold storage on homeward voyage*).

Smith and Sons, Ltd., Sir Wm. Reardon; from United Kingdom and Continent to River Plate Ports (*cargo*).

Sota y Aznar; from Hamburg, Rotterdam, Antwerp, and Bilbao to Pernambuco, Bahia, Rio de Janeiro, Santos, Monte Video, and Buenos Aires (*cargo*).

Stinnes Linien. *See* Hugo Stinnes Linien.

Toyo Kisen Kaisha; from Hong Kong, Moji, Kobe, Yokohama, Honolulu, and Hilo to San Francisco, Portland, Los Angeles, Salina Cruz, Balbao, Callao, Mollendo, Arica, Iquique, and Valparaiso (*passengers and mails*).

Wilh. Wilhelmsen (Wilhelmsen Steamship Line); from New York to Brazil and River Plate Ports (*cargo and refrigerated stores—fortnightly*).

## AUSTRALIA AND NEW ZEALAND.

Aberdeen Line; from London and Plymouth to Melbourne, Sydney, Brisbane and Fremantle; calling at Teneriffe and Cape Town (outward), and Durban, Cape Town and Teneriffe (homeward) (*passengers and cargo*).

Adelaide Steamship Co., Ltd.; between Queensland Ports, Sydney, Newcastle, Melbourne, Adelaide, Albany, and Fremantle (*cargo and stock*); between Port Adelaide, Spencer's Gulf, and West Coast Ports (*passengers, cargo, and stock*).

Anderson, Green and Co., Ltd. *See* Orient Line

Australian Steamships Pty., Ltd.; between Melbourne, Sydney, Newcastle, Brisbane, Queensland Ports, Adelaide, and other South Australian Ports, Albany, Fremantle, Geraldton, and West Australian Ports, Geelong, Portarlington, Warrnambool, Portland, etc. (*passengers and cargo*).

Blue Funnel Line. *See* Holt and Co., Alfred.

British India Line; from London to Fremantle, Adelaide, Melbourne, Sydney, and Brisbane; from Gulf of Mexico to Australian and New Zealand Ports (*passengers and cargo*).

Burns, Philp and Co., Ltd.; between Sydney, Queensland Ports, Darwin, Jarva, and Singapore; between Sydney, Lord Howe Island, Norfolk Island, and New Hebrides; between Sydney, Brisbane, Solomon Islands, and New Britain; between Sydney, Queensland, Papua, and Rabaul; between Sydney and New Britain direct (*mails, passengers, and cargo*).

Canadian-Australian Line. *See* Canadian Pacific Railway Co.

Canadian Government Merchant Marine, Ltd.; from Vancouver (*cargo*); from Montreal (*cargo*). During the winter months the Service from Montreal operates from Halifax, N.S.

Canadian Pacific Railway Co., in conjunction with the Canadian-Australian Line; from Vancouver to Honolulu, Suva, Fiji, Auckland, N.Z., and Sydney, Australia (*passengers and cargo*).

Commonwealth and Dominion Line; from London, Middlesbrough, Hull, and Antwerp to Auckland, Wellington, Lyttelton, and Dunedin, N.Z., *viâ* the Panama Canal; from London, Middlesbrough, Hull, Antwerp, and Hamburg to Melbourne, Sydney, Newcastle, N.S.W., Brisbane, Hobart and Launceston *viâ* Cape. From New York to Australia and New Zealand *viâ* the Panama Canal. Homewards from Australia and New Zealand to U.K. and Continent (*cargo and passengers*).

Commonwealth Government Line of Steamers; from Antwerp, Bristol, Glasgow, Hull, Liverpool, London, Middlesbrough, and Newport to Fremantle, Perth, Adelaide, Hobart, Launceston, Melbourne, Sydney, Newcastle (N.S.W.), and Brisbane (*cargo*); from London to Fremantle, Adelaide, Melbourne, Sydney, and Brisbane, *viâ* Port Said and Colombo (*passengers and cargo*); from United Kingdom Ports to Brisbane, Sydney, and Melbourne *viâ* Panama (*cargo*).

Cornborough Shipping Line, Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Cunard Line; from Bristol, Liverpool, London, and Queenstown to all the chief Ports of Australia and New Zealand (*passengers and cargo*).

Eastern and Australian Steamship Co. Ltd. to Adelaide, Hobart, Melbourne, and Fremantle (*passengers and cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from London (*monthly cargo services*); from New York (*monthly cargo services*); from South Africa (*fortnightly cargo services*)

Federal Steam Navigation Co., Ltd.; from London and West Coast Ports of Great Britain to Principal Ports of Australia (*passengers and cargo*).

Hall Line; from Liverpool to principal Australian Ports (*passengers and cargo*).

Henderson and Co., Ltd.; from Glasgow and Liverpool to principal Australian Ports (*cargo*).

Holt and Co., Alfred; from Glasgow and Continental Ports to Adelaide, Melbourne, Sydney and Brisbane (homeward calling at Liverpool and London in addition); from Singapore to West Australian Ports (*passengers and cargo*).

Leeds Shipping Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Liverpool Line to Australia; from Liverpool to Fremantle, Adelaide, Melbourne, Sydney, Newcastle, Brisbane, Auckland, Wellington, Lyttelton and Dunedin; from Manchester to same ports (*passengers and cargo*).

London Line; from Bristol, Glasgow, Liverpool, and London to principal Australian Ports (*passengers and cargo*).

McIlwraith, McEacharn's Line; from Sydney to Melbourne, Adelaide, Albany, and Fremantle (*cargo*).

New Zealand Shipping Co., Ltd., from London, *viâ* the Panama Canal, to principal Australian and New Zealand Ports (*mails, passengers, and cargo*).

Oakwin Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Orient Line to Australia; from Tilbury to Fremantle, Adelaide, Melbourne, Sydney, and Brisbane, calling at Gibraltar, Toulon, Naples, Port Said, and Colombo, also on the return journey at Plymouth. At certain seasons of the year the vessels call at Hobart, Tasmania (*passengers, cargo, and mails for Commonwealth of Australia*).

Peninsular and Oriental Service to Australia; from London to Adelaide, Melbourne, and Sydney, *viâ* Cape Town (*passengers—one class only—mails and cargo*).

Peninsular and Oriental Steam Navigation Company; four-weekly service from London to Fremantle, Adelaide, Melbourne, and Sydney, calling at Gibraltar, Marseilles, Port Said, Aden, and Colombo, and homewards also at Plymouth (*passengers, mails, and cargo*).

St. Just Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Shaw, Savill and Albion Co., jointly with White Star Line; from London to Port Chalmers *viâ* Panama Canal, calling at Auckland, Wellington, and Lyttleton (*passengers, mails, and cargo*); from London to New Zealand, proceeding on the outward journey *viâ* the Panama Canal, and on the return journey *viâ* Cape Horn, and calling at Monte Video and Teneriffe (*cargo*).

Shire Line; from Glasgow to principal Australian Ports (*cargo*).

Smith and Sons, Ltd., Sir Wm. Reardon; from United Kingdom and Continental Ports to New Zealand (*cargo*).

Trinder, Anderson and Co.; from London to principal Australian Ports (*cargo*).

Turnbull, Martin and Co.; from London to principal Australian Ports (*cargo*).

White Star Line; from Liverpool to Sydney, calling at Cape Town, Albany, Adelaide, and Melbourne (*passengers and cargo*); from Liverpool to Australia, direct (*cargo*); from Liverpool to New Zealand, direct (*cargo*), jointly with Shaw, Savill and Albion Co., Ltd.; from London to Port Chalmers *viâ* the Panama Canal, calling at Auckland, Wellington, and Lyttleton (*passengers, mails, and cargo*).

Workman, Arbuckle and Mackinson; from London to principal Australian Ports (*cargo*)

Wilh. Wilhelmsen: from Norway, Sweden, Denmark, Finland, Hamburg, and Antwerp to principal Australian Ports (*cargo*).

## BALTIC AND NORTH SEA.

American-Hawaiian Steamship Co.; from Los Angeles, Portland, San Francisco, Seattle, and Tacoma to Hamburg, calling at Glasgow, Havre, Liverpool, and London (*fortnightly cargo sailings*).

Baehke and Co.; from Hull, Liverpool, London, Manchester and Swansea.

Becker and Co, Ltd.; from East and West Coast Ports of the United Kingdom to principal Baltic Ports (*passengers and cargo*).

Ben Line Steamers, Ltd.; from Leith and other Scottish Ports to Petrograd and Reval (*cargo and a few passengers*).

Bergenske Dampskibsselskab, Det.; from Glasgow, Manchester, Middlesbrough and Newcastle to Principal Ports of Norway and Sweden (*passengers and cargo*).

Brodin, Erik; from London to Principal Ports of Norway and Sweden (*passengers and cargo*).

Burton, Smart and Orford, Ltd. *See* Scandia Lines.

Cook and Son, John; from Aberdeen and Granton to principal Baltic Ports (*passengers and cargo*).

Cormack and Co., James; from Aberdeen, Dundee, Grangemouth, Leith, Montrose, and Methil to Principal Ports of Norway and Sweden (*passengers and cargo*).

Cornborough Shipping Line, Ltd. *See* Smith and Sons, Ltd., Sir Wm Reardon.

Currie Line. *See* Leith, Hull and Hamburg Steam Packet Co.

Ellerman's Wilson Line; from Grimsby, Hull, Liverpool, London, Newcastle and Swansea to Principal Ports of Baltic, Norway, and Sweden (*cargo*).

Finland Line; from Liverpool to Helsingfors (*cargo*).

Finland Steamship Co., Ltd. *See* Finska Angfartygs Aktiebolaget.

Finska Angfartygs Aktiebolaget; from Hull to Copenhagen, Helsingfors, Hangö, and Abo (*passengers and cargo*); from Stettin and Lübeck to Helsingfors and Hangö (*passengers and cargo*); from Stockholm to Helsingfors and Abo (*passengers and cargo*); from Reval to Helsingfors or Hangö (*passengers and cargo*). The foregoing lines carry mails for Germany, Sweden, and Esthonia. From Hull, London, Liverpool, and Manchester to Finnish Ports (*cargo*); from Rotterdam, Antwerp, and Copenhagen to Finnish Ports (*cargo*).

Forenede Dampskibsselskab., Det.; from Hull, London and Manchester to Ports of Scandinavia (*passengers and cargo*).

Glen and Co.; from Glasgow to Holland and Belgium (*cargo*).

Head Line and Lord Line; from Belfast, Dublin, and Pernau to Petrograd, Reval, and Riga (*chiefly cargo*); from Belfast, Dublin, Cork, and Londonderry to Hamburg, Amsterdam, Antwerp, and Rotterdam (*chiefly cargo*).

Leeds Shipping Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Leith, Hull and Hamburg Steam Packet Co., Ltd.; from Leith to Hamburg (*passengers and cargo*); from Grangemouth and Dundee to Hamburg (*cargo*); from Aberdeen and Middlesbro' to Hamburg (*cargo*); from Leith to Bremen (*cargo*); from Leith to Copenhagen (*cargo*).

Lord Line. *See* Head Line and Lord Line.

Oakwin Steamship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Preston Steam Navigation Co., Ltd.; from East and West Coast Ports of the United Kingdom to Principal Ports of Baltic and Norway (*passengers and cargo*).

Royal Mail Steam Packet Co.; from London, Hamburg, Antwerp, Hull, and Swansea to Brazil (*cargo only*); from Hull, Bremen, and Rotterdam to Havana and Galveston (*passengers, mails, and cargo*); from Hamburg, Southampton, and Cherbourg to New York (*passengers, mails, and cargo*); from Hamburg, Rotterdam, Antwerp, and London to North Pacific Ports, *viâ* Panama Canal (*passengers, mails, and cargo*).

St. Just Steam Ship Co., Ltd. *See* Smith and Sons, Ltd., Sir Wm. Reardon.

Salvesen and Co., Chr.; from Leith to Gothenburg (*cargo*); from Grangemouth to Drontheim, calling at Stavanger, Bergen, Aalesund, and Christiansund (*cargo*).

Salvesen and Co., J. T.; from Grangemouth to principal Baltic Ports (*cargo*).

Scandia Lines; from Hamburg to London (8-*day freight service*); from London to Gothenburg, Christiania, and Copenhagen (10-*day freight service*).

Smith and Sons, Ltd., Sir William Reardon; from New York, Philadelphia, and Baltimore to Bremen and Hamburg (*cargo*); from New York, Philadelphia, and Baltimore to Rotterdam and Hamburg (*cargo*).

Stott and Co., Ltd., W. H.; from London and Manchester to principal Scandinavian Ports (*cargo*).

West Hartlepool Steam Navigation Co., Ltd.; from West Hartlepool to Christiania and Stockholm (*passengers and cargo*).

## CANADA.

Anchor-Donaldson Line; summer service from Glasgow to Quebec and Montreal (*passengers and cargo*); winter service, from Glasgow to St. John, N.B., Halifax, N.S., and Portland, Me. (*passenger and cargo*).

Becker and Co., Ltd.; from East and West Coast Ports of the United Kingdom to Quebec (summer), and St. John, N.B. (winter) (*cargo*).

Cairns, Noble and Co., Ltd.; from Calais, Hull, Middlesbro', Leith, and Dundee to Montreal and Portland, Maine (*cargo*); from Mediterranean Fruit Ports to St. John, N.B., and Montreal.

Canada Steamship Lines, Ltd.; from Montreal (summer), and St. John, N.B. (winter), to Newfoundland (*passengers and cargo*); from Port Arthur to Chicoutimi, calling at Duluth, Fort William, Sault Ste. Marie, Sarnia, Port Colborne, Hamilton, Toronto, Kingston, Brockville, Prescott, Cornwall, Montreal, Quebec, Murray Bay, and Ladousac (*passengers and cargo*).

Canadian Government Merchant Marine, Ltd.; Montreal to Glasgow (*cargo*); Montreal to Liverpool (*cargo*): Montreal to London (*cargo*); Montreal to Swansea and Cardiff (*cargo*). (During the winter months all these services operate from St. John, N.B.)

Canadian Pacific Steamships, Ltd.; from Avonmouth, Hamburg, Havre (*cargo only*), Antwerp (*viâ* Southampton), Glasgow, Belfast, Liverpool, London, and Southampton (*viâ* Cherbourg) to Quebec and Montreal in the St. Lawrence season and to St. John in the winter season (*passengers, freight, and mails*); from London to Quebec (summer season), and St. John, N.B. (winter season) (*cargo*); from Havana and Cuba, *viâ* Boston, to Montreal and Quebec (summer), and St. John (winter) (*passengers and cargo*).

Cunard Line; from Bristol, Liverpool, London and Queenstown to Quebec, Montreal, and Halifax, N.S. (*passengers*).

Dominion Line; from Bristol and Liverpool to Quebec (summer), and St. John, N.B. (winter) (*passengers and cargo*).

Donaldson Brothers, Ltd. *See* Anchor-Donaldson Line.

Ellerman and Bucknall Steamship Co., Ltd.; from India and Java (*monthly cargo*); from the Levant (*monthly cargo*).

Furness Line; from Liverpool to St. John's and Halifax (*cargo*); from London to Montreal (*cargo*); from London to Halifax (*cargo*); from London to St. John (*cargo*).

Furness, Withy and Co., Ltd. *See* Furness Line.

Head Line and Lord Line; from Belfast, Cork, Dublin, Hamburg, Londonderry, and Rotterdam to Baltimore, Galveston, Montreal, New Orleans, Quebec, and St. John, N.B. (*chiefly cargo*).

Houston Lines; from River Plate; from India and Far East (*both cargo services, carrying a few passengers*).

Lord Line. *See* Head Line and Lord Line.

Manchester Liners, Ltd.; from Manchester to Quebec (summer), and St. John, N.B. (winter) (*passengers and cargo*).

New York, Newfoundland and Halifax Steam Ship Co., Ltd.; from St. John's, Newfoundland, Halifax, Nova Scotia, and New York (*passengers, mails, and cargo*).

Preston Steam Navigation Co., Ltd.; from East and West Coast Ports of the United Kingdom to Quebec (summer), and St. John, N.B. (winter) (*cargo*).

Royal Mail Steam Packet Co.; from Bermuda, West Indies, and Demerara, British Guiana to St. John, N.B., and Halifax, N.S. (*passengers, mails, and cargo*); from Hamburg, Rotterdam, Antwerp, and London to North Pacific Ports, *viâ* Panama Canal (*passengers, mails, and cargo*).

White Star Line, in conjunction with Dominion Line; from Liverpool to Quebec and Montreal during summer season; and from Liverpool to Halifax and Portland, Me., during winter season (*passengers and cargo*).

## CHINA AND JAPAN.

Ben Line Steamers, Ltd.; from Antwerp, Leith, London, and Middlesbrough to the Chief Ports of the Straits Settlements, China, and Japan (*cargo and a few passengers*).

Blue Funnel Line. *See* Holt and Co., Alfred.

British India Line; from Calcutta to Kobe and Tokyo (*passengers and cargo*).

Canadian Government Merchant Marine, Ltd.; from Vancouver to Kobe and Tokyo (*cargo*).

Canadian Pacific Railway Co.; from Vancouver to Yokohama, Kobe, Nagasaki, Shanghai, Manila, and Hong Kong (*passengers and cargo*).

China Navigation Co., Ltd.; between Hong Kong and the Chief Ports of China, Siberia, Japan, Korea, Indo-China, Siam, Straits Settlements, East Indies, and Philippine Islands (*passengers and cargo*).

Cunard Line; from Bristol, Liverpool, London, and Queenstown to Principal Ports of China and Japan (*passengers and cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from New York and Gulf Ports (*fortnightly cargo services*); from United Kingdom and Continent (*monthly cargo services*).

Furness, Withy and Co., Ltd. *See* Prince Line.

Glen Line and Shire Line; from London to Yokohama, calling at Genoa, Port Said, Penang, Port Swettenham, Singapore, Hong Kong, Shanghai, Kobe, and Nagasaki (*passengers and cargo*).

Holt and Co., Alfred; from Liverpool (part loading at Glasgow, Bristol Channel Ports, Hamburg and Bremen) to China, Japan and Korea (*passengers and cargo*).

Java-China-Japan Lijn; from San Francisco to Hong Kong, Makassar, and Cheribon to Batavia (*passengers and cargo*).

Nippon Yusen Kaisha; from Yokohama, *viâ* China, Straits Settlements, Colombo, Suez, and Marseilles to London (*passengers and cargo*).

Peninsular and Oriental Line; from London to Straits Settlements, China and Japan (*mails, passengers and cargo*) (fortnightly).

Prince Line; from New York to Straits Settlements, Philippines, China, and Japan (*cargo*).

Rickmers-Linie; from Antwerp and Hamburg to Singapore, Hong Kong, Shanghai, Kobe, Yokohama, and Vladivostock (*freight*).

Shire Line. *See* Glen Line and Shire Line.

Thomson and Co., Wm. *See* Ben Line Steamers, Ltd.

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, Finland, Hamburg, and Antwerp to principal ports of China and Japan (*cargo*).

## FRANCE (NORTHERN), BELGIUM, ETC.

American-Hawaiian Steamship Co.; from Los Angeles, Portland, San Francisco, Seattle, and Tacoma to Antwerp, Hamburg, and Havre, calling at Glasgow, Liverpool, and London (*fortnightly cargo services*).

Bennett Line; from Goole and London to Amsterdam, Rotterdam, Calais, Dunkirk, and Hamburg (*cargo*).

Bristol Steam Navigation Co., Ltd.; from Bristol, Plymouth, and Swansea to Calais, Amsterdam, Rotterdam, Antwerp, and Hamburg (*passengers and cargo*).

British Rhineland Navigation and Transport Co., Ltd. *See* Neptune Line.

Brussels Steamship Co., Ltd.; from London to Antwerp (*cargo*).

Burnham Shipping Co., Ltd.; from Cardiff to Antwerp, Rotterdam, and Hamburg (*cargo*).

Burton, Smart and Orford, Ltd. *See* Neptune Line; and Smart's Continental Line.
Compagnie Générale Transatlantique; from Liverpool and London to Calais, Havre, Dunkirk, Rotterdam, Antwerp, and Hamburg (*passengers and cargo*).
Constantine (R. A.) and Donkin, Ltd; from Middlesbrough to Calais, Havre, Antwerp, Rotterdam, and Amsterdam (*passengers and cargo*)
Cork Steam Ship Co., Ltd.; from Liverpool, Manchester, and Southampton to Amsterdam, Rotterdam, Dunkirk, Antwerp, and Ghent; from Glasgow to Antwerp and Ghent; from Belfast to Ghent (*cargo and passengers*).
Cunard Line; from Bristol, Liverpool, London, and Queenstown to Calais, Havre, etc. (*passengers and cargo*).
Dens and Co., Ltd.; from London to Havre (*cargo*).
Ellerman and Bucknall Steamship Co., Ltd.; from Australia, Hull, and London.
Ensign Shipping Co., Ltd.; from Hull and London to Amsterdam, Rotterdam, and Hamburg (*cargo*).
Furness, Withy and Co., Ltd.; from Middlesbrough to chief Continental Ports (*cargo*).
General Steam Navigation Co., Ltd.; from East Coast Ports of England to Havre, Calais, Boulogne (*cargo*).
Gibson and Co., Ltd., George; from London to Antwerp, Rotterdam, Amsterdam, and Hamburg (*cargo*).
Great Western Railway; from Fishguard and Weymouth to Waterford, Rosslare, Guernsey and Jersey (*passengers and cargo*).
Harrison, Ltd., John; from London to Havre (*cargo*).
Head Line and Lord Line; Belfast, Cork, Dublin, and Londonderry to Amsterdam, Antwerp, Dunkirk, Hamburg, and Rotterdam (*chiefly cargo*).
Holland Steamship Co., Ltd.; from London and Middlesbrough to principal Dutch Ports (*passengers and cargo*).
Hutchinson, Ltd., J. P.; from East Coast Ports of England to Antwerp, Amsterdam, and Rotterdam (*cargo*).
Kaye, Son and Co., Ltd.; from London to North French Ports (*cargo*).
Lancashire and Yorkshire Railway; from Hull to Dutch Ports (*passengers and cargo*).
Limerick Steamship Co., Ltd.; from Limerick and Cork to Dunkirk, Calais, Havre, Rotterdam, Amsterdam, and Antwerp (*passengers and cargo*).
London and North-Eastern Railway (Great Central Section); from Grimsby to Antwerp, Hamburg and Rotterdam (*passengers and cargo*). (Great Eastern Section); from Harwich to Hook of Holland, Antwerp and Rotterdam (*cargo only*); from Harwich to Zeebrugge (*passengers—summer season only*).
Lord Line. *See* Head Line and Lord Line.
Marine Mercantile Co., Ltd.; from East Coast Ports of England to Rotterdam, Antwerp, Amsterdam, and Havre (*cargo*).
Neptune Line; from London to Rotterdam, Cologne, and other Rhine Ports (*bi-weekly freight service*); from Hull, Goole, King's Lynn, and other U.K Ports to Rotterdam, Cologne, and other Rhine Ports (*weekly freight service*).
Ocean Belgian Steam Navigation Co., Ltd. *See* Dens and Co.
Park, Ltd., R. and J.; from London to North French Ports (*cargo*).
Rankie and Son, James; from London to Dutch Ports (*cargo*).
Royal Mail Steam Packet Co.; from Liverpool and Southampton to French, Spanish, and Portuguese Ports to Madeira, Las Palmas, Teneriffe, St Vincent (C.V.), Brazil, Uruguay, and Argentina (*passengers, mails, and cargo*); from London, Hamburg, Antwerp, Hull, and Swansea to Brazil (*passengers, mails, and cargo*); from Hamburg, Antwerp, Rotterdam, and London to North Pacific Ports, *viâ* Panama Canal (*passengers, mails, and cargo*); from Hamburg, Southampton, and Cherbourg to New York (*passengers, mails, and cargo*).
Smart's Continental Lines; from London to Antwerp, Boulogne, Havre, and Rouen (*bi-weekly freight service*).
Steven and Co., Thos. C.; from Goole to Hamburg (*cargo*).
Walford Lines, Ltd.; from London to Antwerp, Boulogne, Ghent, Dunkirk, Havre, and Honfleur (*cargo*); from Liverpool and Manchester to Antwerp, Rotterdam, and Dunkirk (*cargo*); from Goole (York) to Treport (*cargo*).
Zeeland Steamship Co.; from London and Hull to Rotterdam (*cargo and passengers*).

## INDIA, BURMAH AND CEYLON.

Anchor Line; from Glasgow and Liverpool, to Bombay, etc.
Anderson, Green and Co., Ltd. *See* Orient Line.
Anchor-Brocklebank and Well Lines; from Glasgow, Liverpool, Manchester, and Newport to Bombay and Ceylon (*passengers and cargo*).

Asiatic Steam Navigation Co., Ltd.; from Calcutta to Chittagong and Rangoon; from Calcutta to Rangoon and Moulmein; from Calcutta to Bombay *viâ* Ceylon, calling at Coast Ports; from Calcutta, Rangoon, and Madras to Port Blair (Andaman Islands) (*mails and passengers in all cases*).

Ben Line; from Antwerp, Leith, London, and Middlesbrough to Bombay, Calcutta, Madras, and Rangoon (*passengers and cargo*).

Bibby Line; from Liverpool and London to Bombay, Calcutta, Madras, and Rangoon (*passengers and cargo*).

Blue Funnel Line. *See* Holt and Co., Alfred.

British India Line; from London and Middlesbrough to Calcutta, Bombay, and Madras (*passengers and cargo*).

Canadian Government Merchant Marine, Ltd.; from Montreal (*cargo*) (during the winter months from Halifax, N.S.); from Vancouver (*cargo*).

City Line; from Glasgow and Liverpool to Principal Ports of India (*passengers and cargo*).

Clan Line; from Glasgow, Liverpool, and Newport to Calcutta and Madras (*passengers and cargo*).

Cunard Line; from Bristol, Liverpool, London, and Queenstown to Bombay, Madras, Calcutta, and Rangoon (*mails, passengers, and cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from New York (*weekly cargo services*); from Canada (*monthly cargo services*).

Furness Line; from Antwerp to Bombay (*cargo*).

Hall Line; outward services: from Liverpool to Bombay and Karachi, *viâ* Suez Canal (*passengers and cargo*); from Liverpool to Marmagao and Malabar Coast Ports, calling at Lisbon, Bombay, and for Karachi (*passengers and cargo*): these vessels sometimes load at Newport, Glasgow, and Manchester and occasionally call at Marseilles and Naples. Homeward services: from Bombay to Marseilles and Liverpool (*passengers and cargo*); from Karachi to Marseilles and Liverpool (*passengers and cargo*); from Madras Coast to Marseilles, London, and Liverpool (*cargo*); from Malabar Coast to Marseilles, London and Liverpool (*cargo*); from Rangoon to Marseilles and Liverpool (*cargo*); from Rangoon to Alexandria and Liverpool (*cargo*); from Colombo to Marseilles, London, and Liverpool (*cargo*).

Harrison Line; from Newport and Swansea to Calcutta (*cargo*).

Henderson and Co.; from Glasgow and Liverpool to Calcutta and Madras (*cargo*).

Holt and Co., Alfred; from Liverpool (*passengers and cargo*).

Houston Line: from Canada (*cargo services, carrying a few passengers*).

Mogul Steamship Co.; from Birkenhead to Calcutta (*cargo*).

Orient Line; from Tilbury the vessels call at Colombo, on their way to Australia, and also on the return voyage (*passengers, cargo, and mails for Commonwealth of Australia*).

Peninsular and Oriental Line; from London and Marseilles to Bombay and Colombo, calling at Port Said and Aden (*mails, passengers, and cargo*) (weekly); from London to Colombo and Calcutta, calling at Malta (occasionally), Port Said and Aden (*passengers and cargo*) (usually fortnightly).

Turner and Co. *See* Asiatic Steam Navigation Co., Ltd.

Topham, Jones and Railton, Ltd.; from London to Calcutta, Madras Bombay, and Colombo (*cargo*)

Wilh. Wilhelmsen; from Norway, Sweden, Denmark, Finland, and Hamburg. to Principal Ports of India and Ceylon (*cargo*).

## THE MEDITERRANEAN, PORTUGAL, AND SPAIN.

African Steamship Co.; from Liverpool to principal Mediterranean Ports (*passengers and cargo*).

Anchor Brocklebank Line; from Glasgow and Liverpool to Gibraltar, Tangier, Marseilles, and Algiers (*passengers and cargo*).

Anchor Line; from Glasgow and Liverpool to principal Mediterranean Ports (*passengers and cargo*).

Anderson, Green and Co., Ltd. *See* Orient Line.

Armstrong, Lord and Co.; from Ports on East Coast of United Kingdom to principal Mediterranean Ports (*cargo*).

"Artus" Line. *See* Hugo Stinnes Linie.

Bibby Line; from Liverpool and London to principal Mediterranean Ports (*passengers and cargo*).

Bland Line; from the United Kingdom to the Near East and Black Sea, calling at Alicante, Valencia, and other Mediterranean Ports (*monthly passenger and cargo services*); from the United Kingdom to Ceuta, Tetuan, Melilla, Larache, Rabat, and Kenitra (*passengers and cargo*); between Casablanca, Tangier, Gibraltar, Oran, Algiers, and Alicante (*passengers, mails, and cargo*).

British India Line; from London and Middlesbrough to principal Mediterranean Ports (*passengers and cargo*).

Burnham Shipping Co., Ltd.; from Cardiff to Marseilles, Algiers, Tangier, and Gibraltar (*passengers and cargo*).

Compagnie des Messageries Maritimes; from Port St. Louis to Marseilles, Bizerta, Alexandria, Port Said, Beyrouth, Tripoli, Caiffa, and Jaffa (*cargo*).

Compagnie Havraise Péninsulaire de Navigation à Vapeur; from Havre, Dunkirk, and Rouen to Algeria (*passengers and cargo*).

Compañia Transatlantica (Royal Mail Line of Steamers); from Liverpool to Barcelona, Cadiz, Corunna, Cartagena, Lisbon, Azores, and Vigo (*passenger, freight, and mails*).

Compañia Transmediterránea; from Cadiz to Canary Islands; from Algeciras to Ceuta; from Algeciras and Cadiz to Tangier (*passengers, cargo and mails*).

Davies Steamship Co., W. R.: from U.K. Ports (*cargo*).

Dens and Co., Ltd.; from Newcastle-on-Tyne to principal Mediterranean Ports.

Dickinson and Co., Ltd., William; from the Tyne to principal Mediterranean Ports (*cargo*).

Ellerman and Bucknall Steamship Co., Ltd.; from New York (*three-weekly cargo services*).

Ellerman Lines; from Liverpool to Gibraltar, Algiers, Malta, Alexandria, Genoa, Leghorn, Naples, Palermo, Messina, Catania, Bari, Ancona, Venice, Trieste, Fiume, Patras, Piræus, Syra, Volo, Salonica, Smyrna, Constantinople, Lisbon, and Oporto (*passengers and cargo*).

Ellerman's Wilson Line; from Hull to Tangier and Algiers (*passengers and cargo*).

Furness Line; from New York to Piræus, Patras, Salonica, Constantinople, Bulgarian and Danube Ports, Smyrna and Alexandria (*cargo*).

Furness, Withy and Co., Ltd. *See* Furness Line, Johnson Line, and Prince Line.

General Steam Navigation Co., Ltd.; from London to Tangier (*cargo*).

Glen Line and Shire Line; from London to Yokohama, calling, at Genoa and Port Said (*passengers and cargo*).

Glynn and Co., Ltd.; from Liverpool to principal Mediterranean Ports (*cargo*).

Golden Cross Line; from Bristol, Cardiff, Liverpool, and Swansea to principal Mediterranean Ports (*cargo*).

Hall Line; from Glasgow and Liverpool to Aden, Mombasa, Kilnidini, Zanzibar, and ports of Madagascar and Portuguese East Africa, calling at Lisbon, Port Said, and Port Ludan (*cargo*); Beira and other-East African Ports to Marseilles and Liverpool (*cargo*); Aden to Marseilles and Liverpool (*cargo*); Port Ludan to Marseilles and Liverpool (*cargo*).

Hogarth and Sons; from Glasgow to principal Mediterranean Ports (*cargo*).

Hugo Stinnes Linien; from Hamburg to Portuguese Ports, Pernambuco, Monte Video, Buenos Aires, and Rosario (in association with the "Artus" Line, Danzig) (*passengers and cargo*).

Johnson Line, Ltd.; from Liverpool, Swansea, and Antwerp to Piræus, Syra, Smyrna, Volo, Salonica, Constantinople, Bougas, Varna, Constanza, Sulina, Tulcea, Galatz, and Baila (*cargo*).

Koninklijke Hollandsche Lloyd; from Antwerp to Buenos Aires, calling *en route* at Southampton, Cherbourg, La Corma, Vigo, Leixoes, Lisbon, Las Palmas, Pernambuco, Bahia, Rio de Janeiro, Santos, and Monte Video (*passengers, mails, and cargo*).

McAndrews and Co., Ltd.; from London, Liverpool, Glasgow, Hull, Swansea, Antwerp, and Hamburg to Lisbon, Gibraltar and the Principal Ports of Spain (*cargo and a few passengers*).

Moss Line; from Liverpool, Glasgow, and Swansea to Alexandria, calling at Gibraltar, Algiers, and Malta; from Liverpool, Glasgow, and Swansea to Constantinople, calling at Gibraltar, Oran, Malta, Syra, Smyrna, Salonica, and Volo; from Liverpool, Glasgow, and Swansea to Beyrouth, calling at Casablanca, Malta, Famagusta, Sarnaca, Alexandretta, Haifa, Jaffa, and Port Said; from Liverpool, Glasgow, and Swansea to Bordeaux; from Liverpool, Glasgow, and Swansea to Casablanca and all Moroccan Ports (*all cargo services*).

Ocean Belgian Steam Navigation Co., Ltd. *See* Dens and Co.

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Prince Line, Ltd.; from Leith, London, Middlesbrough, Antwerp, and the Tyne to Tunis, Malta, Alexandria, Syra, Cyprus, and Levant (*cargo*).

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Royal Mail Steam Packet Co., from London to Lisbon (*cargo only*); from Swansea to Lisbon and Algave Ports (*cargo only*); from London to Madeira, Las Palmas (*passengers, mails, and cargo*); from Southampton and Liverpool to French, Spanish, and Portuguese Ports, Las Palmas, Teneriffe, St. Vincent (C.V.), Brazil, Uruguay, and Argentina (*passengers, mails, and cargo*).

Salvesen and Co., J. T.; from Grangemouth to Spanish Ports and Marseilles (*cargo*).

Shire Line. *See* Glen Line and Shire Line.

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Sota y Aznar; from Glasgow and Liverpool to Spanish Ports (*cargo*).

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Furness, Withy and Co., Ltd. *See* Prince Line.

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Parker, Ltd., Huddart. *See* Huddart Parker, Ltd.

Peninsular and Oriental Line; from London and Marseilles to the Straits Settlements, China, and Japan, *viâ* Port Said, Aden, and Colombo (*mails, passengers, and cargo*) (fortnightly).

Prince Line; from New York to Straits Settlements, Philippines, China, and Japan (*cargo*).

Rickmers-Linie; from Antwerp and Hamburg to Singapore, Hong Kong, Shanghai, Kobe, Yokohama, and Vladivostock (*freight*).

Shire Line. *See* Glen Line and Shire Line.

Stinnes Linien, Hugo. *See* "Konferenz-Linie."

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Thomson and Co. *See* Ben Line of Steamers, Ltd.

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Turner and Co. *See* Asiatic Steam Navigation Co.

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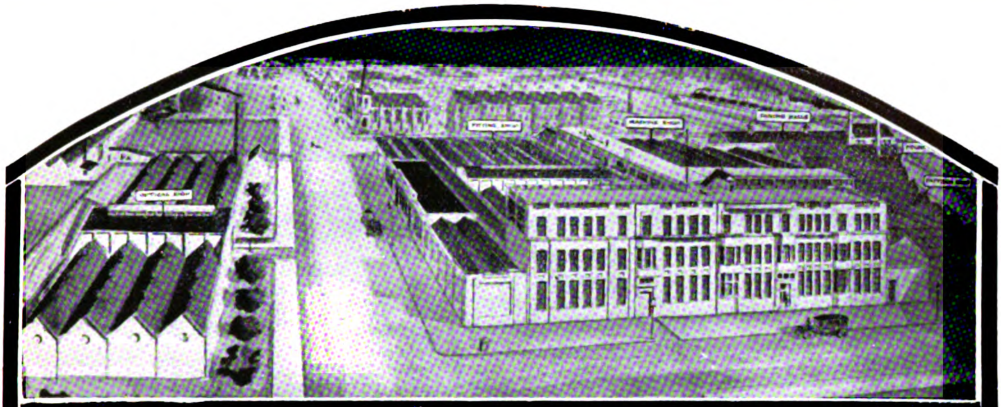

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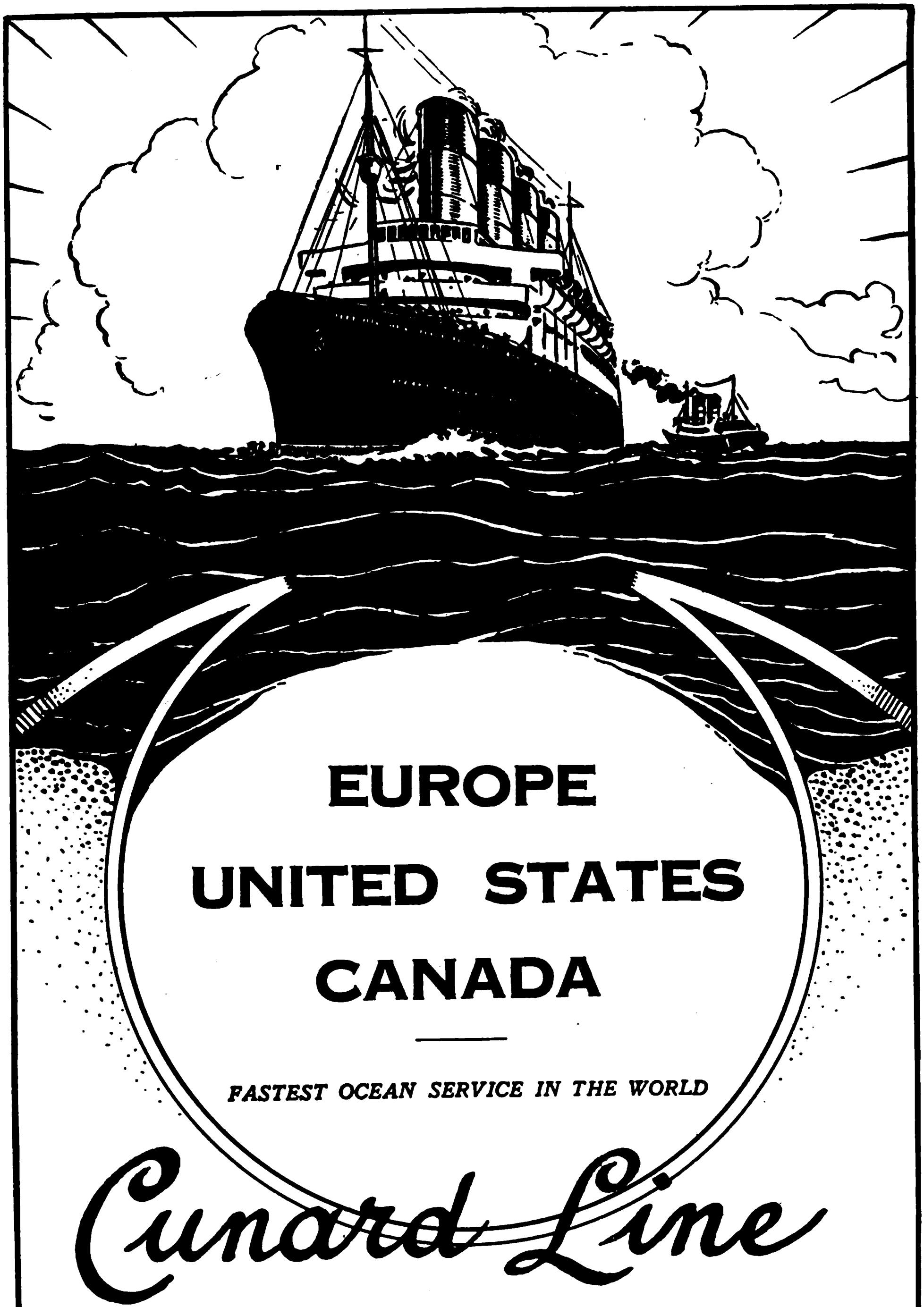

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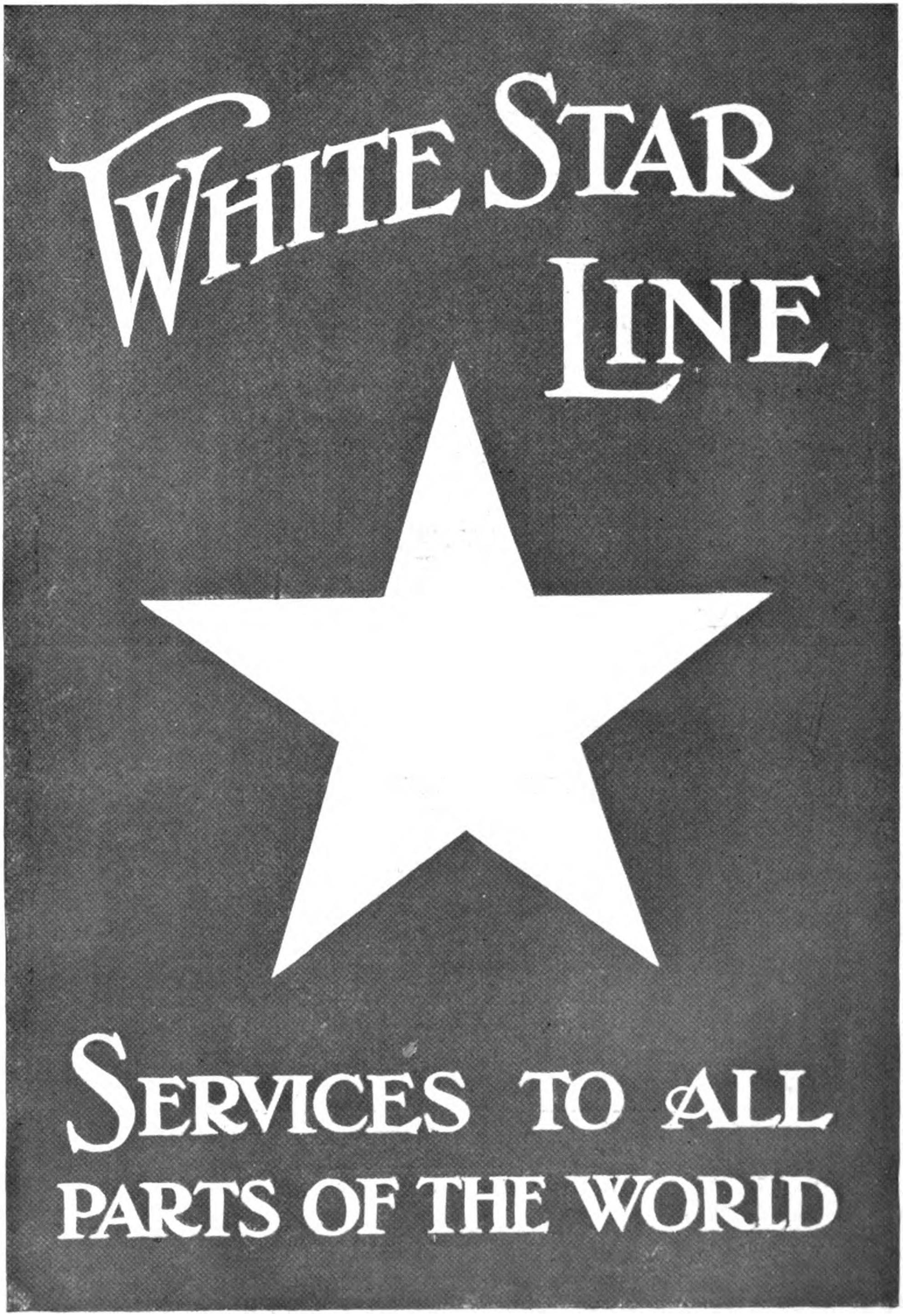
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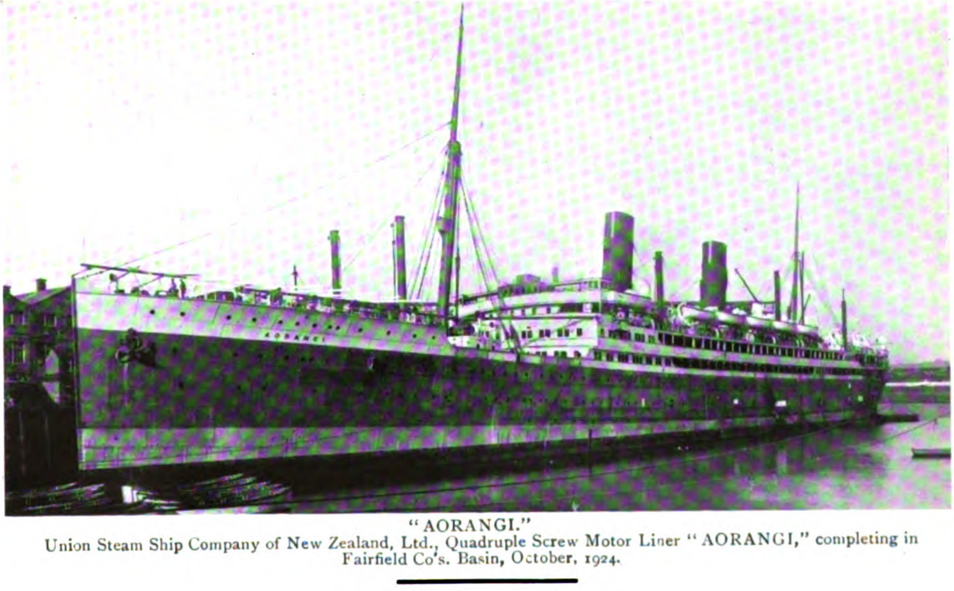

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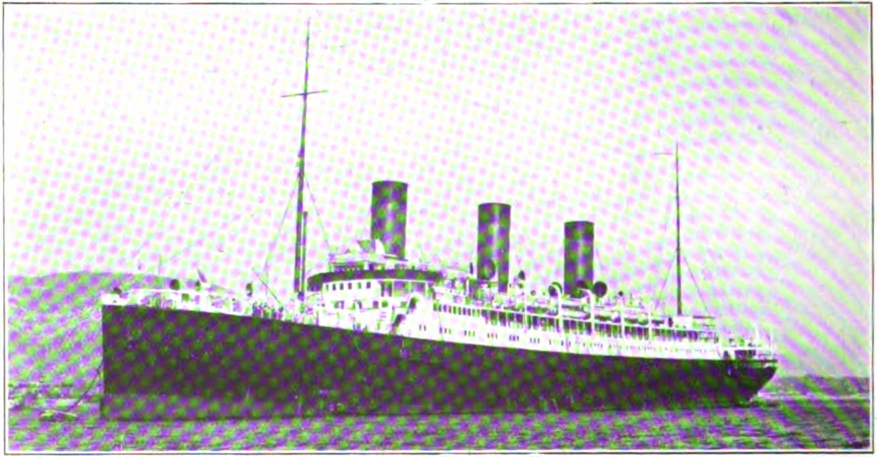

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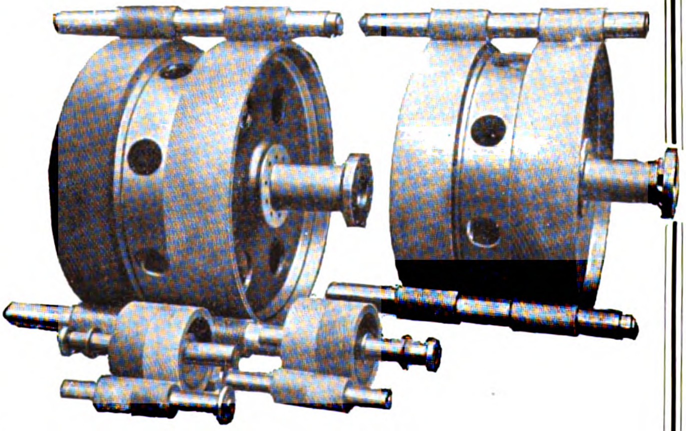

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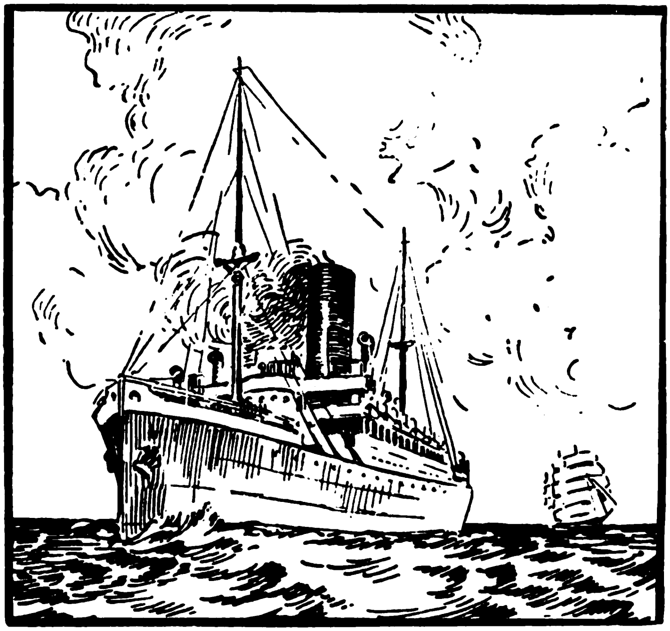

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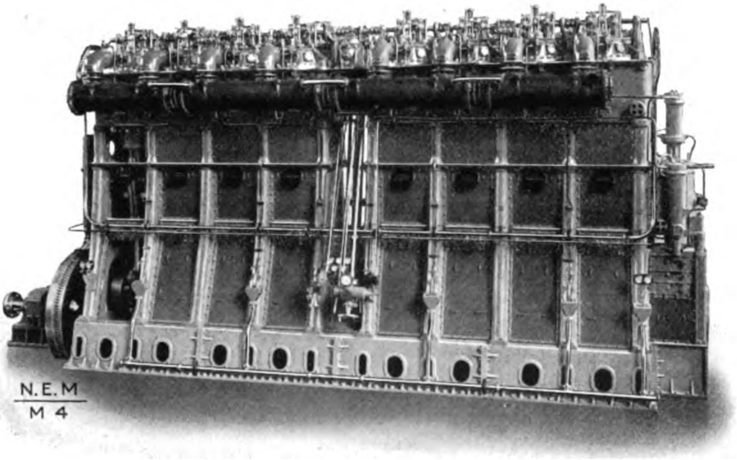

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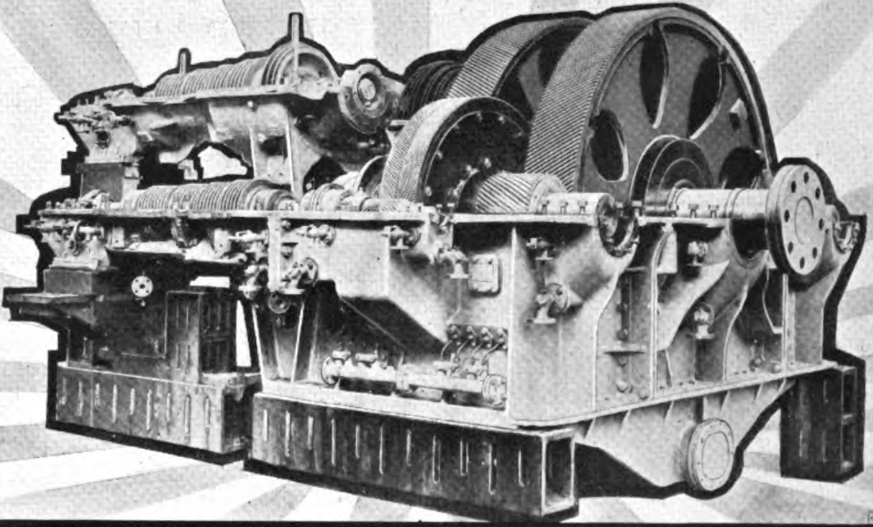

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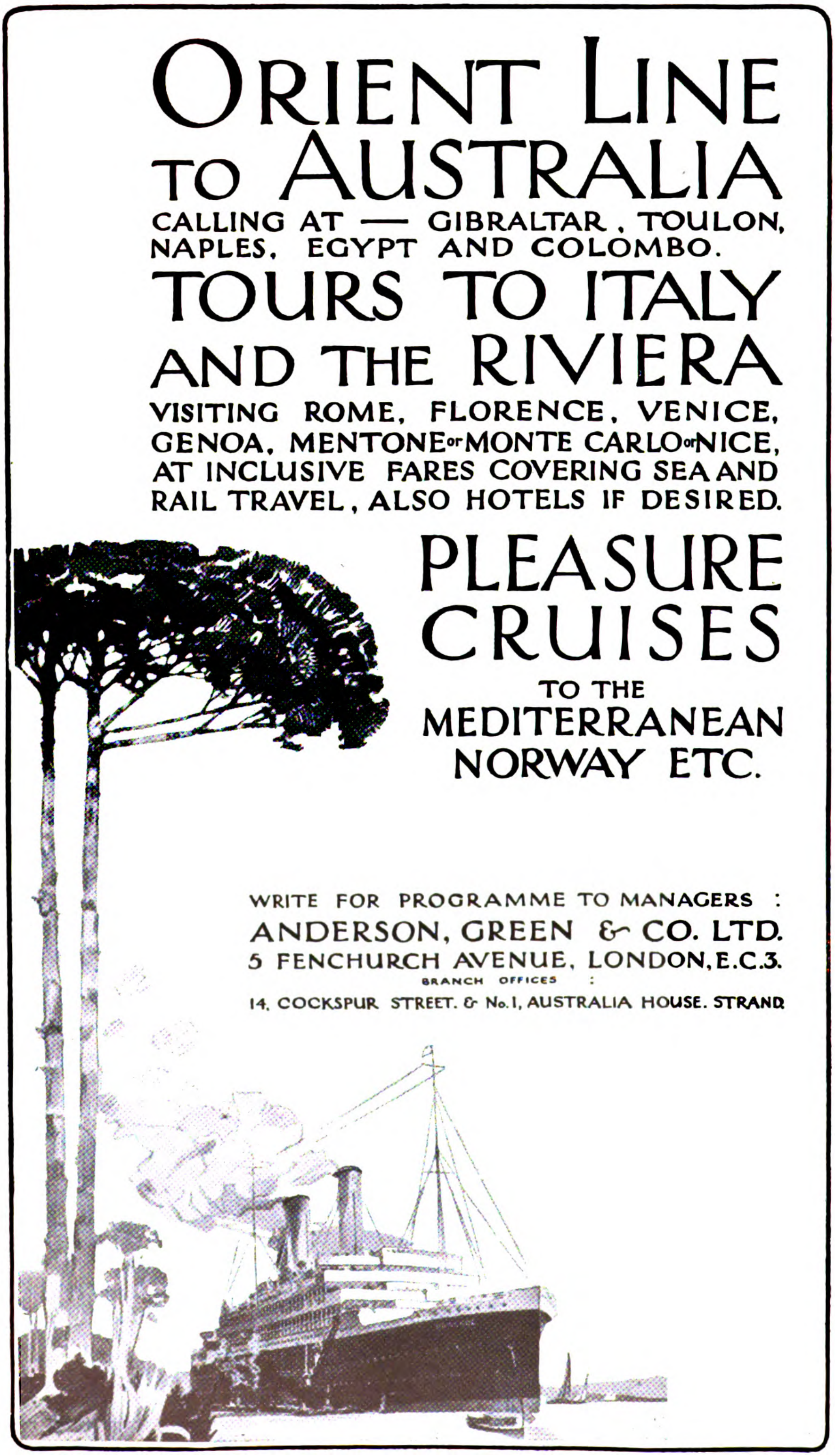

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*b.* battleship; *b.cr.* battle cruiser; *cr.* cruiser; *a.cr.* armoured cruiser; *l.cr.* light cruiser; *s.cr.* scout cruiser; *s.cl.cr.* second class cruiser; *t.b.d.* torpedo-boat destroyer.

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